HOLIDAY COAST BUSHFIRE SOLUTIONS PTY LTD

Steve Ellis
Bushfire Risk Assessor
Mobile: 0419 245 725
E-mail: steve@bushfiresolutions.com.au

BUSHFIRE ASSESSMENT REPORT

REPORT PREPARED IN RELATION TO:	8-LOT SUBDIVISION
PROPERTY DESCRIPTION:	LOTS 9, 17 & 18 in DP 884316, LOT 6 in DP 748478, LOT 1 in DP 374127, GIINAGAY WAY & ALBERT DRIVE, WARRELL CREEK, NSW.
REPORT COMMISSIONED BY: (my Client)	Nambucca Valley Council, c/- Jedcivil

VERSION	REVISION
1	Initial issue
2	Amended due to scope change
3	Amended due to scope change

Date Saved: 15/03/2023
Date Printed: 15/03/2023

Table of Contents

Table of Figures

1. FRAMEWORK

Below are relevant extracts of the document "*Planning for Bushfire Protection 2019*" (*PBP-2019*). Sections have been suitably modified to reflect the scope of this proposed development and its relationship with the relevant legislation.

1.1. Legal Framework

The Environmental Planning and Assessment Act 1979 (EP&A Act) and the Rural Fires Act 1997 (RF Act) were amended on 1 August 2002 to enhance bushfire protection in the development assessment process.

The NSW land use planning framework provides, in broad terms, two main phases: strategic planning and development assessment.

PBP-2019 provides the foundation for the application of bushfire protection during both of these phases of development. Appropriate consideration of bushfire hazards at the strategic planning phase is required by the EP&A Act s.9.1(2) and *PBP-2019* should be considered in applying the Section 9.1 Direction.

At the development assessment phase, development on land that is identified as being bushfire-prone must comply with *PBP-2019*. Some types of development on BPL can be undertaken as Complying Development and must also comply with *PBP-2019*.

A bushfire safety authority (BSA) is required from the NSW RFS for residential and rural residential subdivision and SFPP developments on BPL. An application for a BSA must address the extent to which the development complies with *PBP-2019*.

Building work on BPL must also comply with the requirements of the National Construction Code (NCC). The NCC contains the technical provisions for the design and construction of buildings. Under the Deemed to Satisfy provisions of the NCC, building work on BPL must comply with Australian Standard 3959:2018 Construction of buildings in bushfire-prone areas (AS 3959) or the National Association of Steel Framed Housing (2014) Steel Framed Construction in Bushfire Areas (NASH Standard). This does not apply however in Bushfire Attack Level - Flame Zone (BAL-FZ), or where modified by the specific conditions of the relevant development consent.

1.2. Bushfire Prone Land Mapping

The identification of Bushfire Prone Land in NSW is required under the EP&A Act s.10.3. BPL Maps provide the trigger for the various development assessment provisions.

The Commissioner of the NSW RFS designates what constitutes BPL and how it is to be mapped. Each council prepares a map in accordance with the guidelines and submits the map to the NSW RFS for certification by the Commissioner. These maps are required to be recertified at least every five years and the Commissioner may make direct changes to a BPL Map at any time.

Guidelines for the mapping of BPL can be found on the NSW RFS website at www.rfs.nsw.gov.au.

You can determine whether a site is mapped as being bushfire prone by referring to the BPL Map which is held by the local council, or on the NSW RFS website.

The BPL Map is a trigger for the consideration of BPL Maps for new development. It is not intended as a detailed measure of risk. The map does not form part of the site assessment process, which must be carried out in accordance with Appendix 1 of PBP-2019. A consent authority can refer a development application (DA) to the NSW RFS under the provisions of EP&A Act s.4.15, even where it is not mapped as BPL.

The subject property has been identified as BPL by the Nambucca Valley Council's BPL map, an extract of which is provided below. The BPL map extract identifies much of the subject site, and all of the identified dwelling envelopes, as being outside of bushfire-prone land.

Figure 1: extract of NVC's BPLM

1.3. Strategic planning

Strategic planning is the preparation of planning instruments and policies and includes the making of Local Environmental Plans (LEPs), Development Control Plans (DCPs), housing strategies and other planning instruments that identify proposed uses and land zonings. This also includes any associated strategic proposals and studies.

The strategic planning phase of development is particularly important in contributing to the creation of safer and sustainable communities (COAG 2011). It is an effective way of achieving bushfire protection objectives in new developments.

Strategic bushfire planning and studies are needed to avoid high risk areas, ensure that zoning is appropriate to allow for adequate emergency access, egress, and water supplies, and to ensure that future compliance with *PBP-2019* is achievable.

The most important objective for strategic planning is to identify whether new development is appropriate subject to the identified bushfire risk on a landscape scale. An assessment of proposed land uses and potential for development to impact on existing infrastructure is also a key element of the strategic planning process in bushfire-prone areas. Land use planning policies can be introduced to limit the number of people exposed to unacceptable risk.

Planning instruments and policies can ensure bushfire management principles are given appropriate consideration at all stages of the planning and development process.

Once development has been assessed as being appropriate in its bushfire-prone context, it will need to be capable of complying with *PBP-2019*. The ability of proposed land uses and associated future developments to comply with *PBP-2019* will be assessed at the strategic planning stage. The expectation will be that the development will be able to comply with *PBP-2019* at the DA stage.

1.4. Development assessment

The provisions of *PBP-2019* apply to all development on land which is bushfire-prone (see section 1.2 of this document). *PBP-2019* may also apply where proposals are referred to the NSW RFS under other referral instruments such as EP&A Act s.4.15.

If a development of a type not specifically addressed in *PBP-2019* is proposed on BPL, the development must meet the Aim and Objectives of *PBP-2019* and the consent authority can refer the proposal to the NSW RFS for advice. The NSW RFS will advise which specific standards apply to that development. In these circumstances, the development proposal will be a performance-based solution and in more complex cases, this may be achieved collaboratively through the Bushfire Design Brief (BDB) process.

The vast majority of DAs in NSW are assessed by local councils. Councils may assess DAs for certain developments on BPL that are compliant with this document without the need to refer the proposal to the NSW RFS.

In certain cases building work may not require development consent and can proceed through the Exempt or Complying Development process if the development type is covered by a State Environmental Planning Policy (SEPP) or the relevant LEP.

For further information on development types, please contact the local council or the NSW Department of Planning, Industry and Environment (DPIE).

1.4.1. Development requiring a BSA

Proposals for subdivision and SFPP development on BPL require an approval from the NSW RFS in the form of a BSA under RF Act s.100B.

Development requiring a BSA is considered Integrated Development under EP&A Act s.4.46.

The BSA is critical in ensuring these key developments are designed and located in a manner that is suitable to protect human life and facilitate appropriate operational firefighting arrangements. This is a means by which the NSW RFS Commissioner fulfills their statutory obligation to ensure the protection of the community, including firefighters from the impacts of bushfire.

1.4.2. State significant development and infrastructure

In September 2011, EP&A Act pt. 3A was repealed, leading to the creation of two new major project development categories: state significant infrastructure (SSI) and state significant development (SSD).

Because of their size, complexity, importance and/or potential impact, DPIE is predominantly responsible for assessing these DAs. The Minister for Planning and Public Spaces is the consent authority for SSI and SSD applications.

Applications under the now-repealed Part 3A of the EP&A Act and state significant projects are exempt from requiring a BSA and are not required to be assessed under EP&A Act s4.14.

Given the scale of SSI and SSD projects, the requirements of *PBP-2019* should still be applied, and seeking advice from the NSW RFS is encouraged. Even where comments have been provided by the NSW RFS at the strategic planning stage, future DAs may benefit from further advice from the NSW RFS.

1.4.3. Streamlining development assessment

The NSW Government has provided a pathway for streamlined assessment to occur under the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation) cl.273 for new lots in Urban Release Areas (URAs) that are located on BPL.

The streamlining process allows the assessment of bushfire provisions at subdivision stage within URAs and may exempt the lots from reassessment of bushfire issues when land owners are ready to develop their lots. Post-Subdivision Bushfire Attack Level (BAL) Certificates may be issued assigning BALs to all individual lots within the subdivision. An applicant can rely on this Post-Subdivision BAL Certificate for Complying Development up to and including BAL-29.

The option to use Complying Development also allows for a streamlined process for developing on BPL.

1.4.4. Infill and other development

The EP&A Act s.4.14 requires that the consent authority be satisfied that the relevant specifications and requirements of *PBP-2019* are complied with for development on BPL. This applies to any development other than subdivision of land that could lawfully be used for residential purposes or development for a SFPP. This can be achieved by the following means:

a. the consent authority is satisfied that the development conforms to the specifications and requirements of *PBP-2019*; or

b. the consent authority has been provided with a certificate by a person who is recognised by the NSW RFS as a qualified consultant in bushfire risk assessment stating that the development conforms to the relevant specifications and requirements; or

c. If the consent authority is satisfied that the development does not conform to the relevant requirements of *PBP-2019*, it may still grant consent to the development but only after it has consulted with the Commissioner of the NSW RFS concerning measures to be taken with respect to the development to protect persons, property and the environment from danger that may arise from a bushfire.

1.4.5. Exempt and Complying Development

Some straightforward residential, commercial and industrial development can be undertaken as Exempt or Complying Development under various SEPPs and LEPs.

Exempt Development is minor building works that can be carried out without development approval, such as decks, garden sheds, carports and fences.

Complying Development can be undertaken on lower risk BPL up to and including BAL-29 where the appropriate construction requirements and all other relevant development standards have been met. Complying Development is not permitted on higher risk BPL (BAL-40 or BAL-FZ) and a DA is required in these circumstances.

Specified development requirements and standards apply to new development, including alterations and additions, to ensure the relevant provisions of *PBP-2019* are met. This allows for Complying Development on BPL, while maintaining an appropriate assessment regime for managing bushfire risk.

In certain circumstances, a BAL Certificate must be obtained from the local council or a person recognised by the NSW RFS as a suitably qualified consultant in bushfire assessment, stating that the development is not located in BAL-40 or BAL-FZ.

The development must also meet the identified development standards within the relevant SEPP or LEPs.

1.5. Construction provisions: the National Construction Code (NCC) and bushfire standards

The NCC is a performance based code which comprises the Building Code of Australia (BCA) as Volumes 1 and 2 and the Plumbing Code of Australia as Volume 3.

The NCC contains Performance Requirements and Deemed-to-Satisfy provisions relating to the construction of buildings in bushfire-prone areas. In NSW, these provisions apply to Class 1, 2 and 3 buildings, Class 4 parts of a building, Class 9 buildings that are SFPPs, and associated class 10a buildings and decks.

The construction requirements of AS 3959 and the National Association of Steel-framed Housing (NASH) Standard are a Deemed-to-Satisfy solutions in the NCC, as varied in NSW, for buildings in designated bushfire-prone areas.

1.6. Planning for Bushfire Protection

1.6.1. Aim and objectives

All development on BPL must satisfy the aim and objectives of Planning for Bushfire Protection (*PBP-2019*).

The aim of *PBP-2019* is to provide for the protection of human life and minimise impacts on property from the threat of bushfire, while having due regard to development potential, site characteristics and protection of the environment.

The objectives are to:

- afford buildings and their occupants protection from exposure to a bushfire;
- provide for a defendable space to be located around buildings;
- provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings;
- ensure that appropriate operational access and egress for emergency service personnel and occupants is available;
- provide for ongoing management and maintenance of *Bushfire Protection Measures*; and
- ensure that utility services are adequate to meet the needs of firefighters.

1.6.2. Bushfire protection principles

Bushfire protection can be achieved through a combination of strategies which are based on the following principles:

- control the types of development permissible in bushfire-prone areas;
- minimise the impact of radiant heat and direct flame contact by separating development from bushfire hazards;
- minimise the vulnerability of buildings to ignition and fire spread from flames, radiation and embers;

- enable appropriate access and egress for the public and firefighters;
- provide adequate water supplies for bushfire suppression operations;
- focus on property preparedness, including emergency planning and property maintenance requirements; and
- facilitate the maintenance of Asset Protection Zones (APZs), fire trails, access for firefighting and on site equipment for fire suppression.

1.6.3. How to use PBP

Applications for development on BPL should include a bushfire assessment report. This report must demonstrate that the proposal satisfies the requirements of *PBP-2019*. All applications must meet the Aim and Objectives of *PBP-2019*.

PBP-2019 uses a performance-based approach, and identifies objectives and detailed performance criteria to satisfy desired outcomes and meet the Aim and Objectives. Ultimately, any performance-based approach must demonstrate that bushfire protection is afforded to a proposed development commensurate with the assessed level of bushfire risk and the characteristics of the occupants.

This can be achieved by either applying the identified acceptable solutions, or by preparing a performance-based solution.

A performance-based solution must be designed to achieve the appropriate level of protection by tailoring a package of measures which meet the intent and performance criteria relevant to the proposed development.

Bushfire Protection Measures are set out in Chapter 3 of *PBP-2019*. Performance criteria and acceptable solutions are shown for each specified development type in Chapters 5 – 8 of *PBP-2019*.

1.6.3.1. Bushfire protection measures

Bushfire Protection Measures are the relevant specifications and requirements that need to be satisfied to improve life safety, property protection and community resilience to bushfire attack. They include:

- APZs;
- Access;
- Construction, siting and design;
- Landscaping;
- Services; and
- Emergency and evacuation planning.

1.6.3.2. Intent

For each BPM, a broad intent is outlined. The ensuing performance criteria and acceptable solutions are designed to ensure that the general intent for each BPM is met.

1.6.3.3. Performance criteria

Performance criteria are the outcomes that need to be achieved to satisfy the intent. The performance criteria can be satisfied in one of the following ways:

- acceptable solutions; or
- performance-based solution; or
- the combination of the above.

1.6.3.4. Acceptable solutions

Chapters 5 - 8 of *PBP-2019* identify acceptable solutions which are considered by the NSW RFS as meeting the performance criteria.

1.6.3.5. Performance based solutions

Performance-based solutions allow flexibility and innovation in responding to site-specific opportunities and constraints while still meeting the identified performance criteria. They also allow the consideration of a broad range of issues and information, including bushfire risk, community expectations, environmental protection and the application of new science, processes and technologies.

Performance-based solutions must provide substantiated evidence and clearly demonstrate how the specific objectives and performance criteria are to be satisfied.

When performance-based solutions are proposed, they will be assessed on their merits and individual circumstances. In these circumstances, a Bushfire Design Brief (BDB) process can be undertaken which would involve early agreement on the key elements and acceptance criteria from all stakeholders including the NSW RFS.

Performance-based solutions may be undertaken for any of the BPMs detailed in Chapter 3 of *PBP-2019* and supported in accordance with the submission requirements in Appendix 2 of *PBP-2019*.

2. GENERAL DESCRIPTION OF LAND AND PROPOSAL

2.1. The Land

A site assessment was carried out by me on Tuesday 7th February 2023 for the purpose of preparing a Bushfire Risk Report as required by clause 45 of the *Rural Fires Regulation 2022 – Application for bush fire safety authority*.

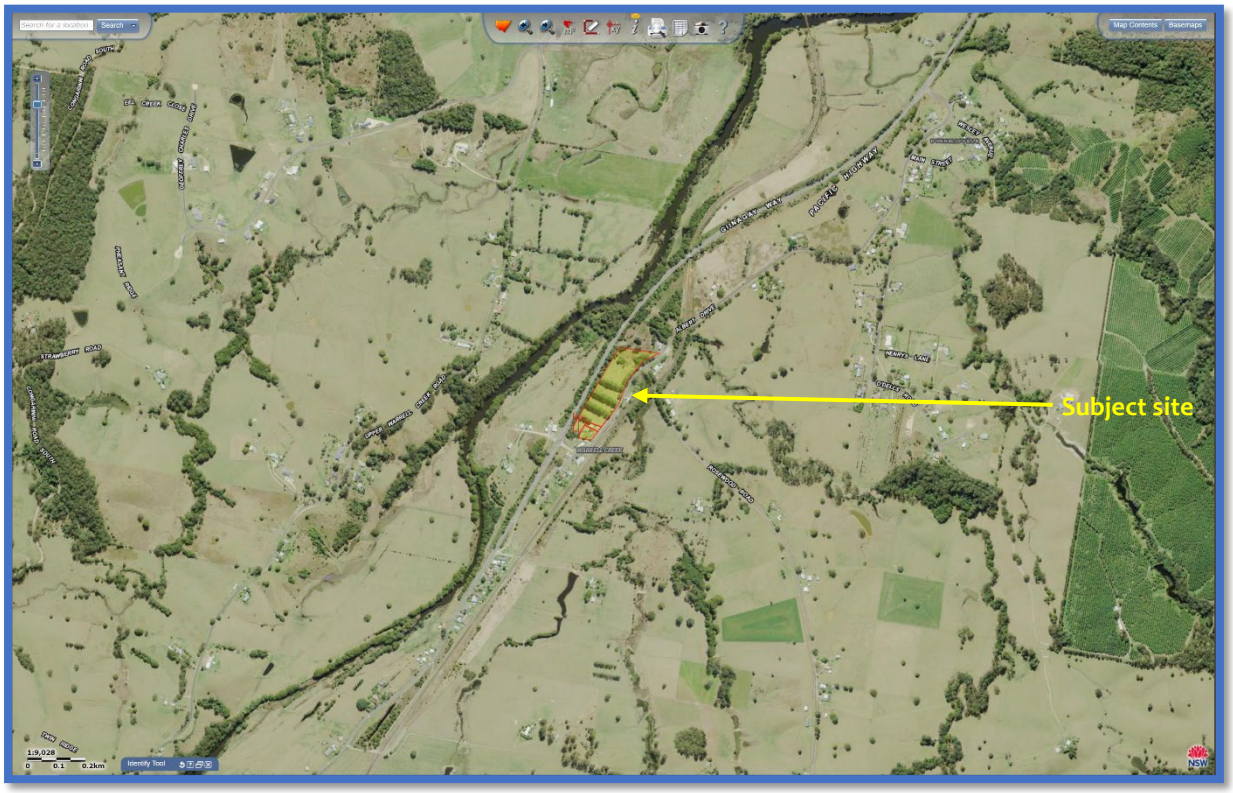


Figure 2: aerial image showing general location of site (© NSW Lands, 2023)

The site is located approximately 7 kilometres south of Macksville. The site consists of multiple lots, several of which are currently occupied by dwellings or other structures.

The site is constrained, from a wildfire-perspective, by vegetation in various aspects: to the north is grasslands and remnant vegetation along watercourses and roadways; to the east are grasslands and remnant vegetation along roadways and railway corridor; to the south is grasslands and remnant vegetation along watercourses and roadways; and to the west is grasslands and remnant vegetation along watercourses and roadways.

Land gradients on the site and the general vicinity are generally slight, as the site sits on the Warrell Creek flood plain. Warrell Creek is located approximately 200 m to the west of the site.

Land use in the immediate vicinity includes both agricultural and village.

The site adjoins Giinagay Way (previously the Pacific Highway) along its western boundary, and Albert Drive (also previously the Pacific Highway) along its eastern boundary. The proposed new dwelling envelopes will front Albert Drive.

The site will not be serviced by reticulated water, therefore a firefighting water supply will be provided on each new lot accommodating a dwelling. There are overhead electricity transmission lines located along Albert Drive.

Figure 3: aerial image of site (© NSW Lands, 2023)

2.2. The Proposal

This report refers to the proposed subdivision of the 5 lots to create 6 new lots by boundary adjustment.

- Proposed lot 1 accommodates an existing dwelling (No. 194 Albert Drive) and will essentially be a lot consolidation;
- Proposed lot 2 accommodates an existing dwelling (No. 190 Albert Drive);
- Proposed lots 3 – 6 will be new vacant lots with complying DEs fronting Albert Drive;

The development fronts both Albert Drive in the east, and Giinagay Way in the west. Existing homes on No. 190 and No. 194 Albert Drive front Albert Drive, while No. 194 also has access to Mill Lane to the south. No new roads are proposed as part of this subdivision.

A plan of the proposal is attached in the following Figure.

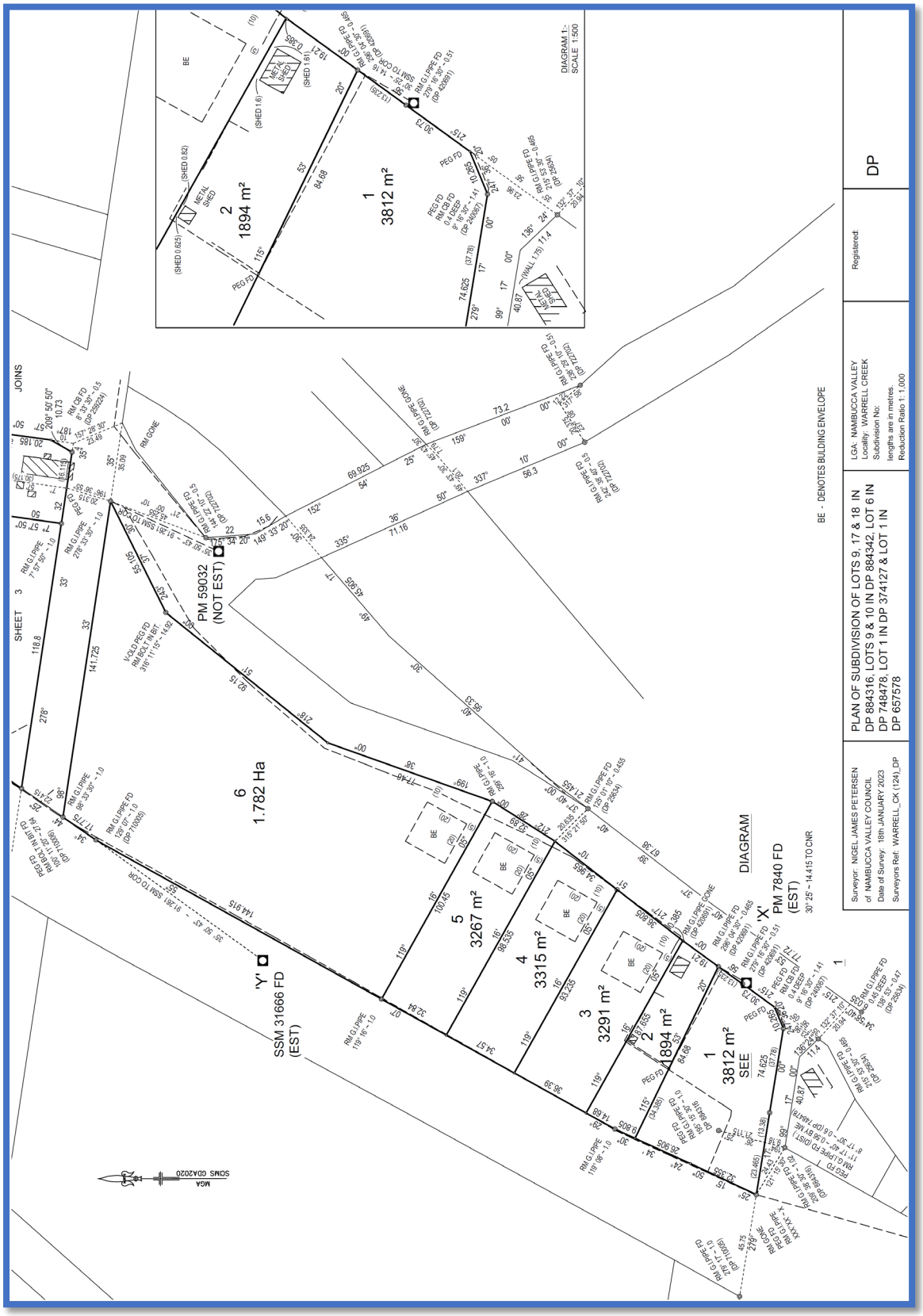


Figure 4: extract of proposed subdivision plan (Nambucca Valley Council, 18/1/2023)

3. SITE ASSESSMENT

The procedure adopted for the site inspection generally followed the site assessment methodology of *PBP-2019*. The methodology is outlined below.

A1.1 - Site assessment methodology for determining APZs	
Identify APZs	
Step 1:	Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2);
Step 2:	Determine the effective slope of the land from the building for a distance of 100 metres (refer to A1.4 and A1.5);
Step 3:	Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and
Step 4:	Match the relevant FFDI, vegetation formation and effective slope to determine the APZ required from the appropriate table of this Appendix (refer to A1.7).

3.1. Vegetation

3.1.1. Vegetation Description

A vegetation assessment was carried out to include a distance of 140 metres from the indicative dwelling envelopes (DEs), in all directions. None of the DEs were pegged at the time of the site assessment, so distances are estimated based on landmarks and features on or around the site. It is determined that the general vegetation description is summarised as follows:

Table 1: vegetation description for proposed lots 3 - 6

North	All of the land within approximately 80 m of the DE on proposed lot 6 is currently cleared and subject to grasslands regrowth. At a distance of approximately 80 m to the north of the DE is remnant regrowth scrub occupying the drier areas around a freshwater wetland.  Figure 5: looking north from the DE on proposed lot 6

East	The front-boundary setbacks for the 4 lots are shown to be generally ~ 9 m. With these setbacks and the Albert Drive road reserve, the immediate ~ 26 m to the east of the DEs will be managed land. Generally beyond Albert Drive at a distance of ~ 26 m is a finger of bush providing a buffer to the north coast railway corridor. The rail corridor is approximately 15 m wide, and separated from grasslands further east by another narrow strip of bush. The rail corridor is managed and the track ballast constitutes a "*rocky outcrop*". These strips of roadside vegetation are excluded from the assessment under the concession provided at A1.10 of Appendix 1 of *PBP-2019* – "*Low threat vegetation*".  **Figure 6: looking north along rail corridor**  **Figure 7: looking south along rail corridor** Opposite proposed lot 6 is an existing residence with managed APZ. To the north of this residence is a freshwater wetland adjoining Rosewood Road. Surrounding the wetland is roadside vegetation, and is excluded from the assessment under the concession provided at A1.10 of Appendix 1 of *PBP-2019* – "*Low threat vegetation*".

	 Figure 8: wetland opposite lot 6
South	All of the land within 120 m to the south of the DE on proposed lot 3 is managed land by virtue of the existing residences and APZs.
West	The rear-boundary setbacks for the 4 lots are shown to be generally ~ 60 m. These areas are able to be managed as APZs. At the rear boundary is a narrow strip of roadside vegetation on both sides of Giinagay Way. These strips of roadside vegetation are excluded from the assessment under the concession provided at A1.10 of Appendix 1 of *PBP-2019* – "*Low threat vegetation*". Beyond Giinagay Way at a distance of ~ 100 m from the proposed DEs is grasslands.

3.1.2. Vegetation Classification

Table 2: vegetation classification for proposed lots 3 - 6

North	*Remnant* @ ~ 80 m, and *Freshwater wetlands* @ ~ 80 m.
East	*Grasslands* @ ~ 60 m, and *Freshwater wetlands* @ ~ 50 m.
South	Managed land.
West	*Grasslands* @ ~ 100 m.

3.2. Effective Slope

A slope assessment was carried out to include a distance of 100 metres from the proposed DEs, in all directions. Photographs were taken to verify my assessment. Slope was determined using a clinometer.

The gradient that would most significantly influence fire behaviour varied, and is summarised as follows:

Table 3: vegetation classification and slope summary for proposed lots 3 - 6

North	*Remnant* @ ~ 80 m, and *Freshwater wetlands* @ ~ 80 m	0° – level 0° - level
East	*Grasslands* @ ~ 60 m, and *Freshwater wetlands* @ ~ 50 m.	Generally flat 0° – level
South	Managed land.	N/A
West	*Grasslands* @ ~ 100 m.	Generally flat

3.3. Past or Future Disturbance Factors (including extenuating circumstances)

Apart from the formalisation of APZs within the proposed lots there are not considered to be any future disturbance factors likely to significantly influence wildfire behaviour across the landscape in the vicinity of the subject site.

4. BUSHFIRE ASSESSMENT MATTERS – CLAUSE 44 OF THE RURAL FIRES REGULATION 2022

4.1. Identification of any significant environmental features on the property

These matters are to be considered and assessed by the applicant in a Statement of Environmental Effects.

4.2. The details of any threatened species, population or ecological community identified under the Biodiversity Conservation Act 2016 that is known to the applicant to exist on the property

These matters are to be considered and assessed by the applicant in a Statement of Environmental Effects.

4.3. The details and location of any Aboriginal object (within the meaning of the National Parks and Wildlife Act 1974) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property

These matters are to be considered and assessed by the applicant in a Statement of Environmental Effects.

4.4. A bushfire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:

4.4.1. The extent to which the development is to provide for setbacks, including asset protection zones

The minimum required setbacks are determined by referring to Appendix 1 of *PBP-2019*, specifically Table A1.12.3 sets out the minimum required APZs for residential development.

Table A1.12.3

Minimum distances for APZs – residential development, FFDI 80 areas (≤29kW/m², 1090K)

KEITH VEGETATION FORMATION	EFFECTIVE SLOPE				
	Up slopes and flat	>0°-5°	>5°-10°	>10°-15°	>15°-20°
	Distance (m) from the asset to the predominant vegetation formation				
Rainforest	9	12	15	20	25
Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	20	25	31	39	48
Grassy and Semi-Arid Woodland (including Mallee)	11	13	17	21	27
Forested Wetland (excluding Coastal Swamp Forest)	8	10	13	17	22
Tall Heath	16	18	20	22	25
Short Heath	9	10	12	13	15
Arid-Shrublands (acacia and chenopod)	6	7	8	9	10
Freshwater Wetlands	5	6	6	7	8
Grassland	10	11	12	14	16

Figure 9: Table A1.12.3 of *PBP-2019*

All of the proposed new lots are able to accommodate dwelling envelopes (DE) beyond these minimum setback distances. The plan provided as **Error! Reference source not found.** above verifies this.

Table 4: vegetation classification and slope summary for proposed lot 1

Aspect	Vegetation Classification and Separation Distance	Effective Slope	Required Minimum Separation Distance
North	*Remnant* @ ~ 80 m, and *Freshwater wetlands* @ ~ 80 m	0° – level 0° - level	**9 m** **5 m**
East	*Grasslands* @ ~ 60 m, and *Freshwater wetlands* @ ~ 50 m.	Generally flat	**12 m** **5 m**
South	Managed land.	N/A	
West	*Grasslands* @ ~ 100 m.	Generally flat	**10 m**

This proposal easily accommodates these distances within the lots being created.

This issue is dealt with in more detail in sections 4.4.7 and 4.4.10.1 of this Report.

4.4.2. The siting and adequacy of water supplies for fire fighting

The site is not serviced by council's reticulated water supply. A firefighting water supply will need to be provided for the future dwellings in the following manner:

- Proposed lots 3 – 5 – 10,000 litres;
- Proposed lot 6 – 20,000 litres.

This issue is dealt with in more detail in section 4.4.10.3 of this Report.

4.4.3. The capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency

Albert Drive is the old Pacific Highway. It has a current width of about 7 m, is line marked, and has a proven capacity to handle heavy traffic loads, including heavy vehicles. The distance from the proposed lots to Giinagay Way (also the old Pacific Highway) is only about 200 m. From here, travel to the north or south is available.

This issue is dealt with in more detail in section 0 of this Report.

4.4.4. Whether or not public roads in the vicinity that link with the fire trail network have two-way access

There are no known fire trails on this site or the adjoining sites. There are no fire trails proposed as part of this development.

4.4.5. The adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response

Access to and from the site will be provided via Albert Drive.

The proposed new lots will need to be provided with property access roads (driveways) that comply with relevant *Acceptable Solutions* in *PBP-2019* where the on-site firefighting water supplies are not accessible from the nature strip. The relevant requirements for property access roads and water supplies are provided at sections 0 and 0 of this Report.

4.4.6. The adequacy of bush fire maintenance plans and fire emergency procedures for the development site

For this proposal it is recommended that minimum IPAs of 20 m are provided in all directions. It is recommended that IPAs are provided in all directions from the future dwellings for a minimum of 20m, or to the property boundary if closer, and the remainder of the lots managed as OPAs in accordance with the NSW Rural Fire Service standards for APZs.

The requirement to maintain the landscaping within the IPAs of the proposed lots in accordance with the principles contained within the NSW Rural Fire Service documents "*Appendix 4*" of *PBP-2019* and "*Standards for Asset Protection Zones*" is deemed to be a sound passive bushfire protection measure. These documents are provided as Appendix A of this Report for the benefit of the Client and future owners.

4.4.7. The construction standards to be used for building elements in the development

The procedure adopted for determining the construction standards applicable followed the site assessment methodology of Appendix 1 of *PBP-2019*. The methodology is outlined below.

A1.1 - Site assessment methodology for determining APZs and BALs
Identify APZs Step 1: Determine vegetation formation in all directions around the building to a distance of 140 metres (refer to A1.2); Step 2: Determine the effective slope of the land from the building for a distance of 100 metres (refer to A1.4 and A1.5); Step 3: Determine the relevant FFDI for the council area in which the development is to be undertaken (refer to A1.6); and Step 4: Match the relevant FFDI, vegetation formation and effective slope to determine the APZ required from the appropriate table of this Appendix (refer to A1.7).
Identify construction requirements Step 1: Follow steps 1 - 3 above; Step 2: Determine the separation distance by measuring from the edge of the unmanaged vegetation to the closest external wall;

Step 3:	Match the relevant FFDI, appropriate vegetation, distance and effective slope to determine the appropriate BAL using the relevant tables at the end of this section (A1.12.5, A1.12.6 and A1.12.7); and
Step 4:	Refer to Section 3 in AS 3959 and NASH Standard to identify appropriate construction requirements for the calculated BAL.

Table A1.12.6 of *PBP-2019* (Figure 10 below) is used to determined construction standards as specified in *AS 3959-2018 Construction of buildings in bushfire-prone areas*.

Table A1.12.6

Determination of BAL, FFDI 80 – residential development

	KEITH VEGETATION FORMATION	BUSH FIRE ATTACK LEVEL (BAL)				
		BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
		Distance (m) asset to predominant vegetation class				
ALL UPSLOPE AND FLAT LAND	Rainforest	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Forest (wet and dry sclerophyll) including Coastal Swamp Forest, Pine Plantations and Sub-Alpine Woodland	< 15	15 -< 20	20 -< 29	29 -< 40	40 -< 100
	Grassy and Semi-Arid Woodland (including Mallee)	< 8	8 -< 11	11 -< 16	16 -< 22	22 -< 100
	Forested Wetland (excluding Coastal Swamp Forest)	< 6	6 -< 8	8 -< 12	12 -< 18	18 -< 100
	Tall Heath	< 12	12 -< 16	16 -< 23	23 -< 32	32 -< 100
	Short Heath	< 7	7 -< 9	9 -< 14	14 -< 20	20 -< 100
	Arid-Shrublands (acacia and chenopod)	< 5	5 -< 6	6 -< 9	9 -< 14	14 -< 100
	Freshwater Wetlands	< 4	4 -< 5	5 -< 7	7 -< 11	11 -< 100
	Grassland	< 7	7 -< 10	10 -< 14	14 -< 20	20 -< 50

Figure 10: extract of Table A1.12.6 of *PBP-2019*

From Figure 10 above, the following Tables are produced for each of the indicative DEs for each of the proposed new lots.

Table 5: vegetation classification, slope summary and BALs for proposed lot 1

Aspect	Vegetation Classification and Separation Distance	Effective Slope	BAL-29	BAL-19	BAL-12.5
North	*Remnant* @ ~ 80 m, and *Freshwater wetlands* @ ~ 80 m	0° – level 0° - level	9 m - <14 m 5 m - <7 m	14 m - <20 m 7 m - <11 m	**20 m - <100 m** **11 m - <100 m**
East	*Grasslands* @ ~ 60 m, and *Freshwater wetlands* @ ~ 50 m.	Generally flat	10 m - <14 m 5 m - <7 m	14 m - <20 m 7 m - <11 m	**20 m - <50 m** **11 m - <100 m**
South	Managed land.	N/A			
West	*Grasslands* @ ~ 100 m.	Generally flat	10 m - <14 m	14 m - <20 m	**20 m - <50 m**

The result od the site assessment reveals that the BAL for each of the proposed new lots 3 – 6 inclusive are as follows:

- **Lot 3 – BAL-Low** (more than 50 m from unmanaged grasslands, more than 100 m from freshwater wetlands)
- **Lot 4 - BAL-Low** (more than 50 m from unmanaged grasslands, more than 100 m from freshwater wetlands)
- **Lot 5 - BAL-12.5**
- **Lot 6 - BAL-12.5**

The specifications for sections 3 & 5 of *AS 3959 Construction of buildings in bushfire-prone areas* (BAL-12.5) are provided as Appendix B of this Report for the benefit of the Client and future property owners.

4.4.8. The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development

No sprinkler systems are required as part of this subdivision proposal.

4.4.9. Any registered fire trails on the property

There are no fire trails known to be on the site.

4.4.10. An assessment of the extent to which the proposed development conforms with or deviates from Planning for Bushfire Protection

4.4.10.1. Asset Protection Zones / Separation Distances

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 6 – APZs and Landscaping

	Performance Criteria	Acceptable Solution	Complies / Does not comply
Asset Protection Zones	**[1]** Potential building footprints must not be exposed to radiant heat levels exceeding 29 kW/m² on each proposed lot.	**[1.1]** APZs are provided in accordance with Tables A1.12.2 and A1.12.3 based on the FFDI.	Complies
	[2] APZs are managed and maintained to prevent the spread of a fire towards the building.	**[2.1]** APZs are managed in accordance with the requirements of Appendix 4.	Complies
	[3] The APZs is provided in perpetuity.	**[3.1]** APZs are wholly within the boundaries of the development site	Complies
	[4] APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is minimised.	**[4.1]** APZs are located on lands with a slope less than 18 degrees.	Complies
Landscaping	**[5]** Landscaping is designed and managed to minimise flame contact and radiant heat to buildings, and the potential for wind-driven embers to cause ignitions.	**[5.1]** Landscaping is in accordance with Appendix 4; and **[5.2]** Fencing is constructed in accordance with section 7.6.	Complies Complies

In relation to *Acceptable Solution* 1.1, sections 4.4.1 and 4.4.7 of this Report verify that the minimum APZ distances have been achieved by this proposal.

In relation to *Acceptable Solution* 2.1 & 5.1, at the issue of subdivision certificate and in perpetuity, the existing cleared areas of the vacant lots should be managed as OPA in accordance with the NSW Rural Fire Service guidelines. Occupied lots should have 20 m IPA established prior to occupation, in accordance with the NSW Rural Fire Service guidelines. These are attached as Appendix A of this Report.

In relation to *Acceptable Solution* 5.2, *PBP-2019* clarifies as follows.

> **7.6 Fences and gates**
> Fences and gates in bush fire prone areas may play a significant role in the vulnerability of structures during bush fires. In this regard, all fences in bush fire prone areas should be made of either hardwood or non-combustible material.
> However, in circumstances where the fence is within 6m of a building or in areas of BAL-29 or greater, they should be made of non-combustible material only.

4.4.10.2. Access

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 7 - Access

	Performance Criteria	Acceptable Solution	Complies / Does not comply
General Access Requirements	**[6]** Firefighting vehicles are provided with safe, all-weather access to structures.	**[6.1]** Property access roads are two-wheel drive, all-weather roads;	Able to comply
		[6.2] Perimeter roads are provided for residential subdivisions of three or more allotments;	Not applicable
		[6.3] Subdivisions of three or more allotments have more than one access in and out of the development;	Complies
		[6.4] Traffic management devices are constructed to not prohibit access by emergency services vehicles;	Not applicable
		[6.5] Maximum grades for sealed roads do not exceed 15 degrees and an average grade of not more than 10 degrees or other gradient specified by road design standards, whichever is the lesser gradient;	Not applicable
		[6.6] All roads are through roads;	Not applicable
		[6.7] Dead end roads are not recommended, but if unavoidable, are not more than 200 metres in length, incorporate a minimum 12 metres outer radius turning circle, and are clearly sign posted as a dead end;	Not applicable

		[6.8] Where kerb and guttering is provided on perimeter roads, roll top kerbing should be used to the hazard side of the road;	Not applicable
		[6.9] Where access/egress can only be achieved through forest, woodland and heath vegetation, secondary access shall be provided to an alternate point on the existing public road system; and	Not applicable
		[6.10] One way only public access roads are no less than 3.5 metres wide and have designated parking bays with hydrants located outside of these areas to ensure accessibility to reticulated water for fire suppression.	Not applicable
	[7] The capacity of access roads is adequate for firefighting vehicles.	**[7.1]** The capacity of perimeter and non-perimeter road surfaces and any bridges/causeways is sufficient to carry fully loaded firefighting vehicles (up to 23 tonnes); bridges/ causeways are to clearly indicate load rating.	Not applicable
	[8] There is appropriate access to water supply.	**[8.1]** Hydrants are located outside of parking reserves and road carriageways to ensure accessibility to reticulated water for fire suppression;	Not applicable
		[8.2] Hydrants are provided in accordance with the relevant clauses of AS 2419.1:2005 - *Fire hydrant installations System design, installation and commissioning*; and	Not applicable
		[8.3] There is suitable access for a Category 1 fire appliance to within 4m of the static water supply where no reticulated supply is available	Able to comply

Perimeter Roads	**[9]** Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating as well as providing a safe operational environment for emergency service personnel during firefighting and emergency management on the interface	**[9.1]** Are two-way sealed roads;	Not applicable
		[9.2] Minimum 8m carriageway width kerb to kerb;	Not applicable
		[9.3] Parking is provided outside of the carriageway width;	Not applicable
		[9.4] Hydrants are located clear of parking areas;	Not applicable
		[9.5] Are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Not applicable
		[9.6] Curves of roads have a minimum inner radius of 6m;	Not applicable
		[9.7] The maximum grade road is 15 degrees and average grade of not more than 10 degrees;	Not applicable
		[9.8] The road crossfall does not exceed 3 degrees; and	Not applicable
		[9.9] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Not applicable
Non-Perimeter Roads	**[10]** Access roads are designed to allow safe access and egress for firefighting vehicles while residents are evacuating.	**[10.1]** Minimum 5.5m carriageway width kerb to kerb;	Not applicable
		[10.2] Parking is provided outside of the carriageway width;	Not applicable
		[10.3] Hydrants are located clear of parking areas;	Not applicable
		[10.4] Roads are through roads, and these are linked to the internal road system at an interval of no greater than 500m;	Not applicable
		[10.5] Curves of roads have a minimum inner radius of 6m;	Not applicable

		[10.6] The road crossfall does not exceed 3 degrees; and	Not applicable
		[10.7] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches, is provided.	Not applicable
Property Access Roads	**[11]** Firefighting vehicles can access the dwelling and exit the property safely.	**[11.1]** There are no specific access requirements in an urban area where an unobstructed path (no greater than 70m) is provided between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles. In circumstances where this cannot occur, the following requirements apply:	Not applicable
		[11.2] Minimum 4m carriageway width;	Able to comply
		[11.3] In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay;	Not applicable
		[11.4] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches;	Able to comply
		[11.5] Provide a suitable turning area in accordance with Appendix 3;	Able to comply
		[11.6] Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress;	Able to comply

		[11.7] The minimum distance between inner and outer curves is 6m;	Able to comply
		[11.8] The crossfall is not more than 10 degrees;	Able to comply
		[11.9] Maximum grades for sealed roads do not exceed 15 degrees and not more than 10 degrees for unsealed roads; and	Able to comply
		[11.10] A development comprising more than three dwellings has access by dedication of a road and not by right of way. Note: Some short constrictions in the access may be accepted where they are not less than 3.5m wide, extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.	Not applicable

In relation to *Acceptable Solution* [8.3], as no reticulated water supply is available, an on-site firefighting water supply is to be provided on proposed lots 3 – 6. Where a firefighting vehicle can not gain unobstructed access to within 4 m of each of these supplies (tanks) from the public road reserve / nature strip, the driveway within each of the lots will need to comply with the relevant *Acceptable Solutions* [11.1] – [11.9] above, and Appendix 3 of *PBP-2019* (provided as Appendix C of this Report for the benefit of the Client and future property owners).

4.4.10.3. Utility Services

Below is a table setting out the *Performance Criteria* and *Acceptable Solutions* for residential and rural-residential subdivisions as required by Chapter 5 of *PBP-2019*, and a statement as to whether the proposal meets the *Acceptable Solution*.

Table 8 - Services

	Performance Criteria	Acceptable Solution	Complies / Does not comply
Water Supplies	**[12]** Adequate water supplies is provided for firefighting purposes	**[12.1]** Reticulated water is to be provided to the development where available;	Not applicable
		[12.2] A static water and hydrant supply is provided for non-reticulated developments or where reticulated water supply cannot be guaranteed; and	Able to comply
		[12.3] Static water supplies shall comply with Table 5.3d of *PBP-2019*.	Able to comply
	[13a] Water supplies are located at regular intervals; and **[13b]** The water supply is accessible and reliable for firefighting operations.	**[13.1]** Fire hydrant, spacing, design and sizing complies with the relevant clauses of Australian Standard AS 2419.1:2005;	Not applicable
		[13.2] Hydrants are not located within any road carriageway; and	Not applicable
		[13.3] Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.	Not applicable
	[14] Flows and pressure are appropriate.	**[14.1]** Fire hydrant flows and pressures comply with the relevant clauses of AS 2419.1:2005	Not applicable
	[15] The integrity of the water supply is maintained.	**[15.1]** All above-ground water service pipes are metal, including and up to any taps; and	Able to comply
		[15.2] Above-ground water storage tanks shall be of concrete or metal	Able to comply

Electricity Services	**[16]** Location of electricity services limits the possibility of ignition of surrounding bush land or the fabric of buildings.	**[16.1]** Where practicable, electrical transmission lines are underground; Where overhead, electrical transmission lines are proposed as follows: * lines are installed with short pole spacing of 30m, unless crossing gullies, gorges or riparian areas; and * no part of a tree is closer to a power line than the distance set out in ISSC3 *Guideline for Managing Vegetation Near Power Lines*.	Complies
Gas Services	**[17]** Location and design of gas services will not lead to ignition of surrounding bushland or the fabric of buildings.	**[17.1]** Reticulated or bottled gas is installed and maintained in accordance with AS/NZS 1596:2014 - *The storage and handling of LP Gas*, the requirements of relevant authorities, and metal piping is used; **[17.2]** All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side; **[17.3]** Connections to and from gas cylinders are metal; **[17.4]** Polymer-sheathed flexible gas supply lines are not used; and **[17.5]** Above-ground gas service pipes are metal, including and up to any outlets.	Able to comply Able to comply Able to comply Able to comply Able to comply

The property is not serviced by council's reticulated water supply. A firefighting water supply of at least 10,000 litres will need to be provided at construction stage of the future dwellings on proposed lots 3 - 6. Access to these on-site firefighting water supplies is to be provided in the following manner, either:

- unobstructed access to within 4 m of the supply (tank) from the public road reserve / nature strip; or

- the driveway (property access road) providing firefighting vehicle access to the tank is to meet the relevant *Acceptable Solutions* [11.1] – [11.9] above, and Appendix 3 of *PBP-2019* (provided as Appendix C of this Report for the benefit of the Client and future property owners).

The existing overhead electricity transmission lines are located on the western side of Albert Drive. The electricity supply to the future DEs can be located either above-ground from the existing transmission lines.

All of the other relevant *Acceptable Solutions* in relation to water, electricity and LPG supplies are able to be provided at construction stage of future dwellings on proposed lots 3 - 6.

4.5. Existing Dwellings

The following sections assess the bushfire resilience of the existing homes on proposed lots 1 and 2 against the suite of *Bushfire Protection Measures* listed in *PBP-2019*.

4.5.1. Proposed lot 1 – No.194 Albert Drive

4.5.1.1. APZ Dimensions

The existing separation distances between the existing home and the surrounding unmanaged vegetation is summarised below.

Table 9: vegetation classification and slope summary for proposed lot 1

North	*Managed land* (new lots)	N/A
East	*Grasslands* @ + 50 m	Generally flat
South	Managed land.	N/A
West	*Grasslands* @ + 50 m	Generally flat

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

The home is provided with managed yard areas within the boundaries for distances generally as follows:

- North – 12 m;
- East – 17 m;
- South – 14 m
- West – 22 m.

4.5.1.2. Landscaping

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

Figure 11: gardens in contact with building

4.5.1.3. Vehicular Access

Firefighting vehicle access onto the site (to access the on-site tanks) is available, if required, however this would require fencing to be replaced with gates. The three (3) tanks on the site would be best accessed by portable firefighting pumps due to site constraints. Given the low wildfire threat and risk to the property, the property access road requirements of *PBP-2019* need not be applied to this lot.

4.5.1.4. Water Supply

The dwelling's water supply is located in three (3) above-ground tanks. The two (2) tanks located in the northern APZ are approximately 20,000 litres each (fed by rain water), and the elevated tank in the western APZ is approximately 20,000 litres (fed by bore water).

Figure 12: 2 x ~20,000 L. concrete tanks

Figure 13: 1 x ~20,000 L. concrete tank

The only practical access to these tanks would be with portable firefighting pumps rather than a firefighting vehicle.

4.5.1.5. Electricity Supply

The existing electricity transmission lines are located above ground from overhead transmission lines in Albert Drive.

4.5.1.6. LPG Supply

There is one (1) fixed LPG cylinder on the site and a compliance plate is affixed to the home.

4.5.1.7. Building Construction

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

4.5.2. Proposed lot 2 – No.190 Albert Drive

4.5.2.1. APZ Dimensions

The existing separation distances between the existing home and the surrounding unmanaged vegetation is summarised below.

Table 10: vegetation classification and slope summary for proposed lot 1

North	*Managed land* (new lots)	N/A
East	*Grasslands* @ + 50 m	Generally flat
South	Managed land.	N/A
West	*Grasslands* @ + 50 m	Generally flat

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

The home is provided with managed yard areas within the boundaries for distances generally as follows:

- North – 4.5 m;
- East – 22 m;
- South – 6 m
- West – 9 m.

4.5.2.2. Landscaping

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

4.5.2.3. Vehicular Access

Firefighting vehicle access onto the site (to access the on-site tank) would not be available for firefighting vehicles once access is restricted to the northern side boundary. The one (1) tank on the site would be best accessed by portable firefighting pump due to site

constraints. Given the low wildfire threat and risk to the property, the property access road requirements of *PBP-2019* need not be applied to this lot.

4.5.2.4. Water Supply

The dwelling's water supply is located in one (1) above-ground tank. The tank's capacity is unknown, however its capacity appears to be similar to the 5,000 gal tanks on the neighbouring property.

Figure 14: existing tank at rear of home

The only practical access to this tank would be with portable firefighting pumps rather than a firefighting vehicle.

4.5.2.5. Electricity Supply

The existing electricity transmission lines are located above ground from overhead transmission lines in Albert Drive.

4.5.2.6. LPG Supply

There are two (2) fixed LPG cylinders on the site and no compliance plate is affixed to the home.

4.5.2.7. Building Construction

The existing home is situated in the BAL zone of **BAL-Low**, no APZ or *AS 3959* construction requirements apply to it.

5. CONCLUSION AND RECOMMENDATIONS

This report refers to the proposed subdivision of 5 lots to create 6 new lots by boundary adjustment.

- Proposed lot 1 accommodates an existing dwelling (No.194 Albert Drive) and will essentially be a lot consolidation;
- Proposed lot 2 accommodates an existing dwelling (No.190 Albert Drive);
- Proposed lots 3 – 6 will be new vacant lots with complying DEs fronting Albert Drive;

The development fronts both Albert Drive in the east, and Giinagay Way in the west. Existing homes on No.190 and No.194 Albert Drive front Albert Drive, while No.194 also has access to Mill Lane to the south. No new roads are proposed as part of this subdivision. Both of these homes are located within the BAL-Low zone.

The site adjoins Giinagay Way (previously the Pacific Highway) along its western boundary, and Albert Drive (also previously the Pacific Highway) along its eastern boundary. The proposed new dwelling envelopes on proposed lots 3 – 6 will front Albert Drive.

The site will not be serviced by reticulated water, therefore a firefighting water supply will be provided on each new proposed lots 3 – 6. There are overhead electricity transmission lines located along Albert Drive, these are not affected by unmanaged vegetation in the vicinity of the proposed lots 3 – 6.

All of the relevant *Acceptable Solutions* contained within *PBP-2019* have been, or are able to be, met. Therefore I recommend the proposal be approved subject to the following specific recommendations.

1. At the issue of subdivision certificate and in perpetuity, the existing cleared areas of the vacant lots 3 – 6 should be managed as OPA in accordance with the NSW Rural Fire Service guidelines. Once occupied, the lots should have 20 m IPA established prior to occupation, in accordance with the NSW Rural Fire Service guidelines. These are attached as Appendix A of this Report.
2. The future dwellings on proposed lots 3 – 6 are to be erected within the identified DEs on Figure 4 of this Report, and constructed to the BALs as listed below:
   - Lot 3 – BAL-Low
   - Lot 4 – BAL-Low
   - Lot 5 – BAL-12.5
   - Lot 6 – BAL-12.5
3. At the construction stage of the future dwellings on each proposed lot 3 - 6, a firefighting water supply is to be provided in accordance with Table 8 of this Report. The firefighting water supply is to be accessible via either: a property access road complying with Table 7 of this Report; or from within 4 m unobstructed distance from the nature strip.

5.1. Limitation

5.1.1 This Report and the subsequent recommendations reflect the reasonable and practical efforts of the author. It is important to note that the author (and State and Local Government authorities) cannot guarantee that bushfire ignition and subsequent bushfire damage will not occur.

5.1.2 Current legislation is essentially 'silent' in relation to the maintenance of bushfire protection measures. Maintenance is a major factor in the effectiveness of any BPM provided/installed. The extent to which the BPMs are implemented and maintained will affect the probability of achieving adequate bushfire safety margins.

5.1.3 Given the natural phenomenon of bushfires, and limitations in technology and research, a system to guarantee the survival of life and property cannot be made. This is reflected in the following statements of limitations:

> *The goal of 'absolute' or '100%' safety is not attainable and there will always be a finite risk of injury, death or property damage.* (IFEG-2005)

> *No development in a bushfire prone area can be guaranteed to be entirely safe from bushfires.* (**PBP-2001**)

> *Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains.* (**PBP-2001**)

Holiday Coast Bushfire Solutions Pty Ltd
Grad. Dip. Design in Bushfire Prone Areas (UWS)

6. REFERENCES

ABCB, *Building Code of Australia*, CanPrint Publications Pty Ltd, ACT.

NSW Government, *Environmental Planning and Assessment Act 1979* (as amended), http://www.legislation.nsw.gov.au

NSW Government, *Rural Fires Act 1997*, http://www.legislation.nsw.gov.au

NSW Government, *Rural Fires Regulation 2022*, http://www.legislation.nsw.gov.au

NSW Government Geospatial Portal (2023), *various images*, http://maps.six.nsw.gov.au/

NSW Rural Fire Service (2019), *Planning for Bushfire Protection 2019*, Sydney.

NSW Rural Fire Service (2006), *Planning for Bushfire Protection 2006 including Addendum Appendix 3*, Sydney.

NSW Rural Fire Service (2005), *Standards for asset protection zones*, Sydney.

Standards Australia (2018), *Australian Standard 3959-2018 Construction of buildings in bushfire-prone areas*, Sydney.

7. APPENDICES

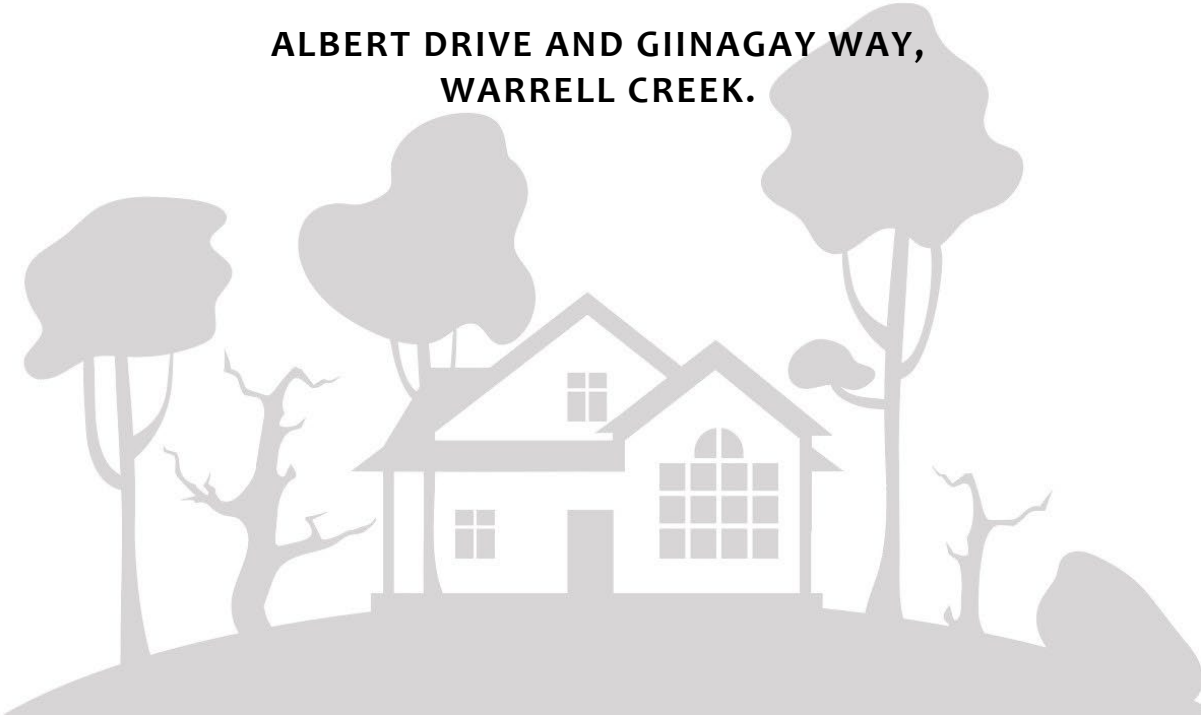
Appendix A	Standards for APZs (NSW Rural Fire Service, 2005) and Appendix 4 of *PBP-2019*.
Appendix B	Sections 3 & 5 (BAL-12.5) of *AS 3959 Construction of buildings in bushfire-prone areas*
Appendix C	Appendix 3 of *PBP-2019* (access requirements for firefighting vehicles)

NVC-2023-08 APPENDIX A

STANDARDS FOR ASSET PROTECTION ZONES

SUBDIVISION

ALBERT DRIVE AND GIINAGAY WAY, WARRELL CREEK.



APPENDIX 4

ASSET PROTECTION ZONE REQUIREMENTS

In combination with other BPMs, a bush fire hazard can be reduced by implementing simple steps to reduce vegetation levels. This can be done by designing and managing landscaping to implement an APZ around the property.

Careful attention should be paid to species selection, their location relative to their flammability, minimising continuity of vegetation (horizontally and vertically), and ongoing maintenance to remove flammable fuels (leaf litter, twigs and debris).

This Appendix sets the standards which need to be met within an APZ.

A4.1 Asset Protection Zones

An APZ is a fuel-reduced area surrounding a building or structure. It is located between the building or structure and the bush fire hazard.

For a complete guide to APZs and landscaping, download the NSW RFS document *Standards for Asset Protection Zones* at the NSW RFS Website www.rfs.nsw.gov.au.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows for suppression of fire;
- an area from which backburning or hazard reduction can be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Bush fire fuels should be minimised within an APZ. This is so that the vegetation within the zone does not provide a path for the spread of fire to the building, either from the ground level or through the tree canopy.

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the building;
- damage to the building asset from intense radiant heat; and
- ember attack.

The methodology for calculating the required APZ distance is contained within Appendix 1. The width of the APZ required will depend upon the development type and bush fire threat. APZs for new development are set out within Chapters 5, 6 and 7 of this document.

In forest vegetation, the APZ can be made up of an Inner Protection Area (IPA) and an Outer Protection Area (OPA).

A4.1.1 Inner Protection Areas (IPAs)

The IPA is the area closest to the building and creates a fuel-managed area which can minimise the impact of direct flame contact and radiant heat on the development and act as a defendable space. Vegetation within the IPA should be kept to a minimum level. Litter fuels within the IPA should be kept below 1cm in height and be discontinuous.

In practical terms the IPA is typically the curtilage around the building, consisting of a mown lawn and well maintained gardens.

When establishing and maintaining an IPA the following requirements apply:

Trees

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m; and
- preference should be given to smooth barked and evergreen trees.

Shrubs

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

A4.1.2 Outer Protection Areas (OPAs)

An OPA is located between the IPA and the unmanaged vegetation. It is an area where there is maintenance of the understorey and some separation in the canopy. The reduction of fuel in this area aims to decrease the intensity of an approaching fire and restricts the potential for fire spread from crowns; reducing the level of direct flame, radiant heat and ember attack on the IPA.

Because of the nature of an OPA, they are only applicable in forest vegetation.

When establishing and maintaining an OPA the following requirements apply:

Trees

- tree canopy cover should be less than 30%; and
- canopies should be separated by 2 to 5m.

Shrubs

- shrubs should not form a continuous canopy; and
- shrubs should form no more than 20% of ground cover.

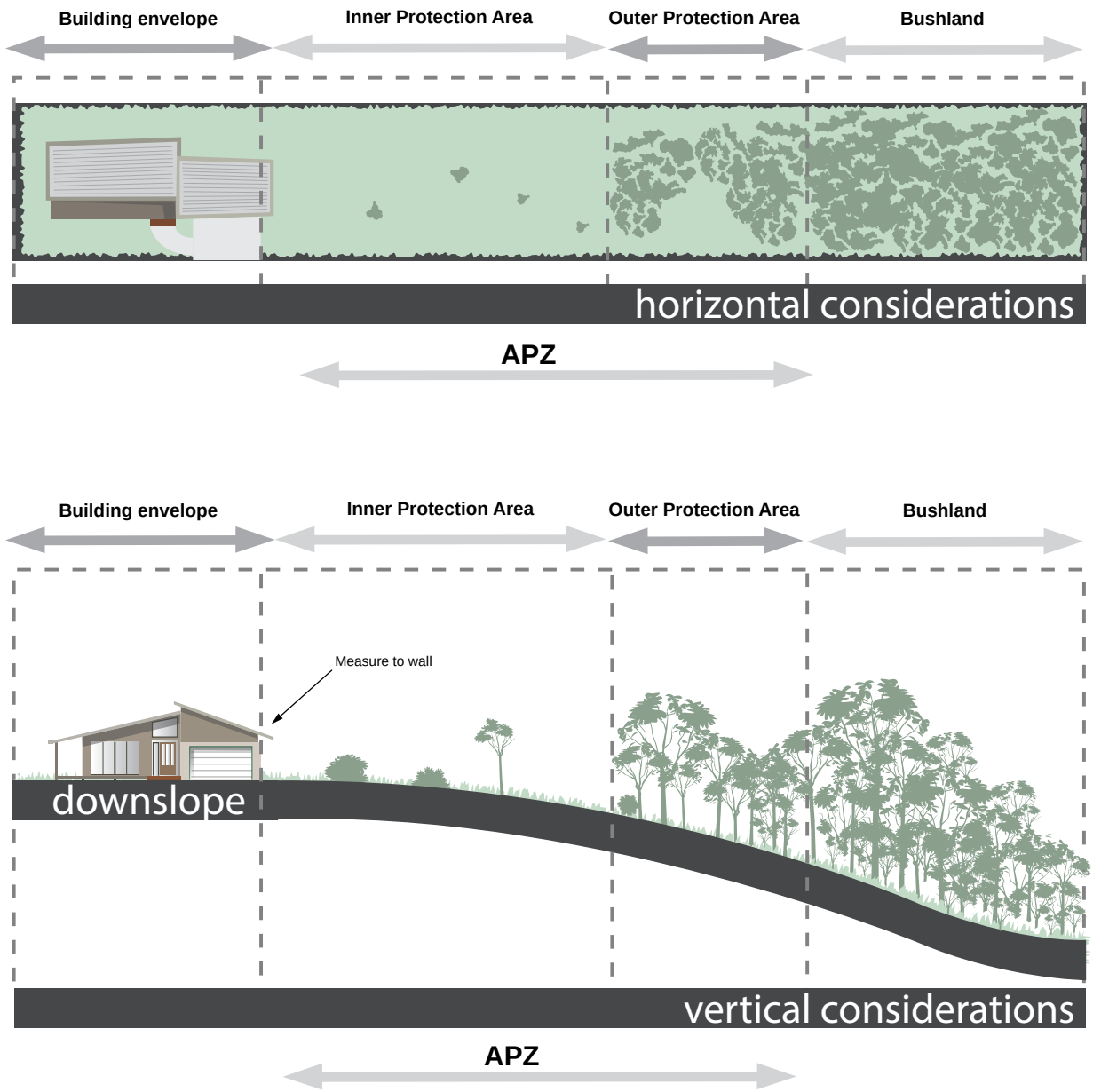
Grass

- grass should be kept mown to a height of less than 100mm; and
- leaf and other debris should be removed.

An APZ should be maintained in perpetuity to ensure ongoing protection from the impact of bush fires. Maintenance of the IPA and OPA as described above should be undertaken regularly, particularly in advance of the bush fire season.

Figure A4.1

Typical Inner and Outer Protection Areas.



standards

for asset protection zones

protection

NSW RURAL FIRE SERVICE

STANDARDS FOR ASSET PROTECTION ZONES

INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

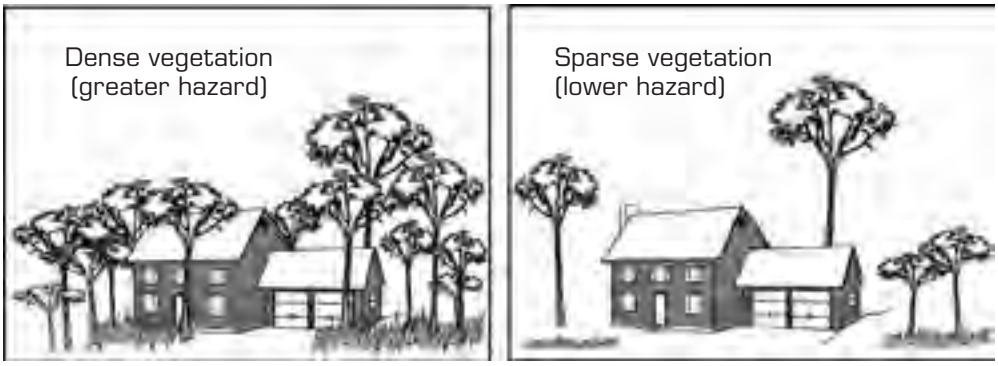
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:
- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling
If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset
If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

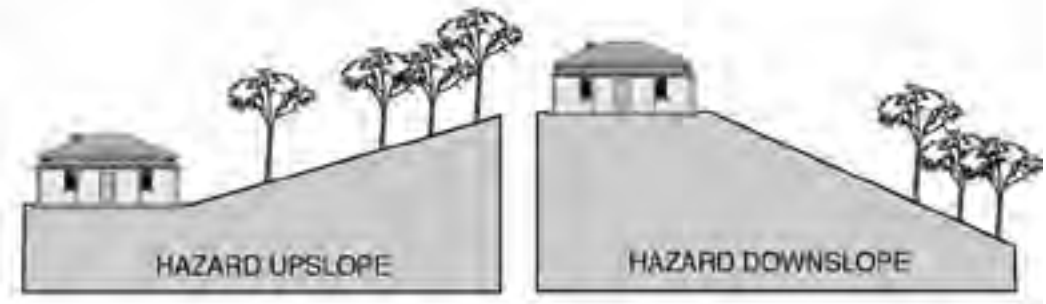
If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.

Gentle slopes require a smaller APZ distance than steep slopes



A hazard downslope will require a greater APZ distance than a hazard upslope of the asset

Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling
If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset
If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels
Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass
Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey
The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

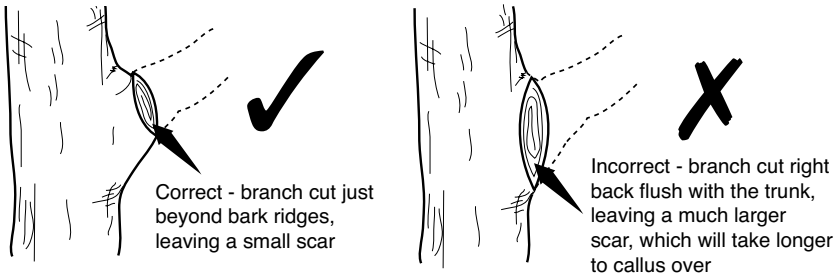
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at **www.agric.nsw.gov.au/noxweed/;**
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3 Remove or thin understorey plants, trees and shrubs less than three metres in height

The removal of significant native species should be avoided.

Prune in acordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)
Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning
Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning
Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees*) for more information on tree pruning.

4. Slashing and trittering
Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

5. Ploughing and grading
Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)
Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning,* or contact your local RFS for advice.

7. Burning (pile burning)
In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning.*

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

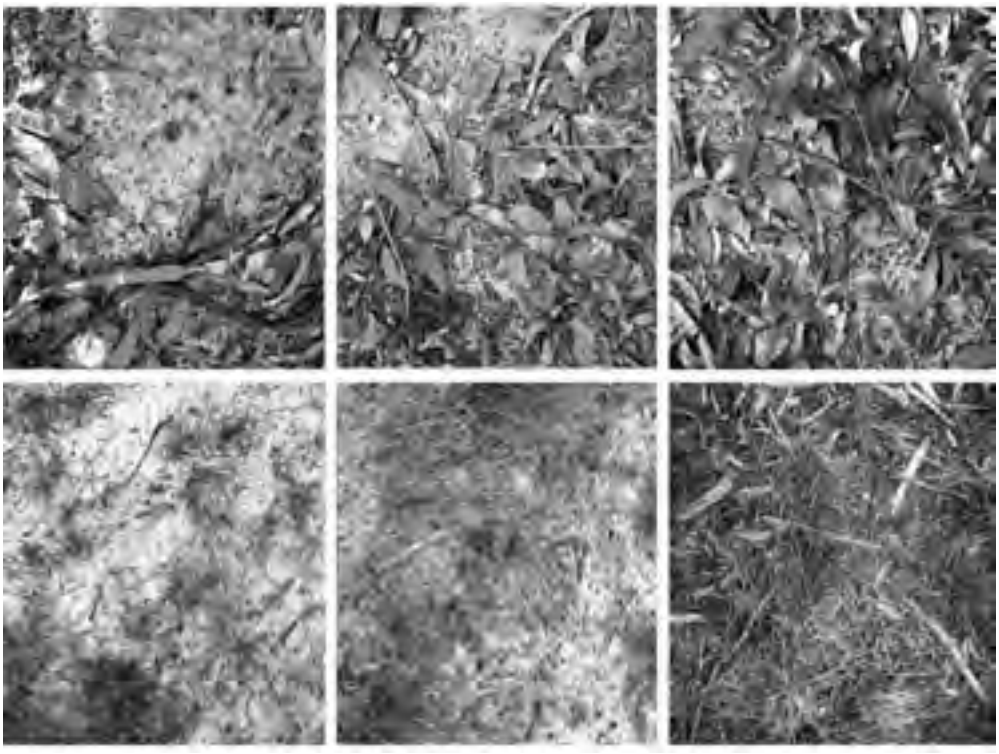
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

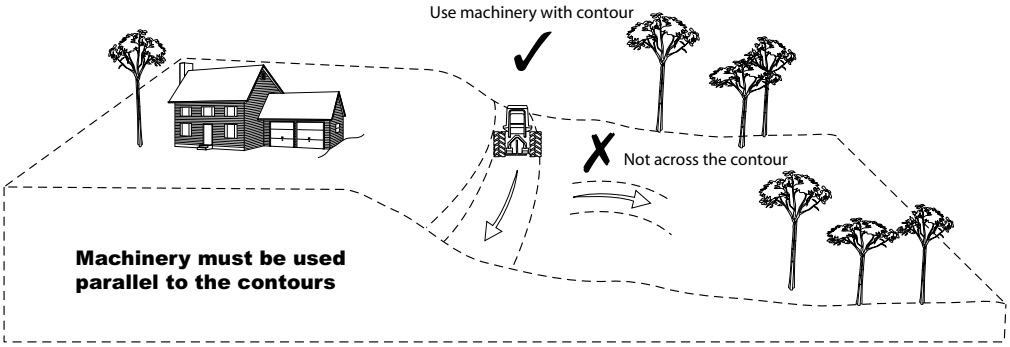
When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



50% **75%** **100%**

Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.



STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ
When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable.

Removal of other materials
Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

Other protective features
You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

Plants that are less flammable, have the following features:

- high moisture content
- high levels of salt
- low volatile oil content of leaves
- smooth barks without "ribbons" hanging from branches or trunks; and
- dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees.*

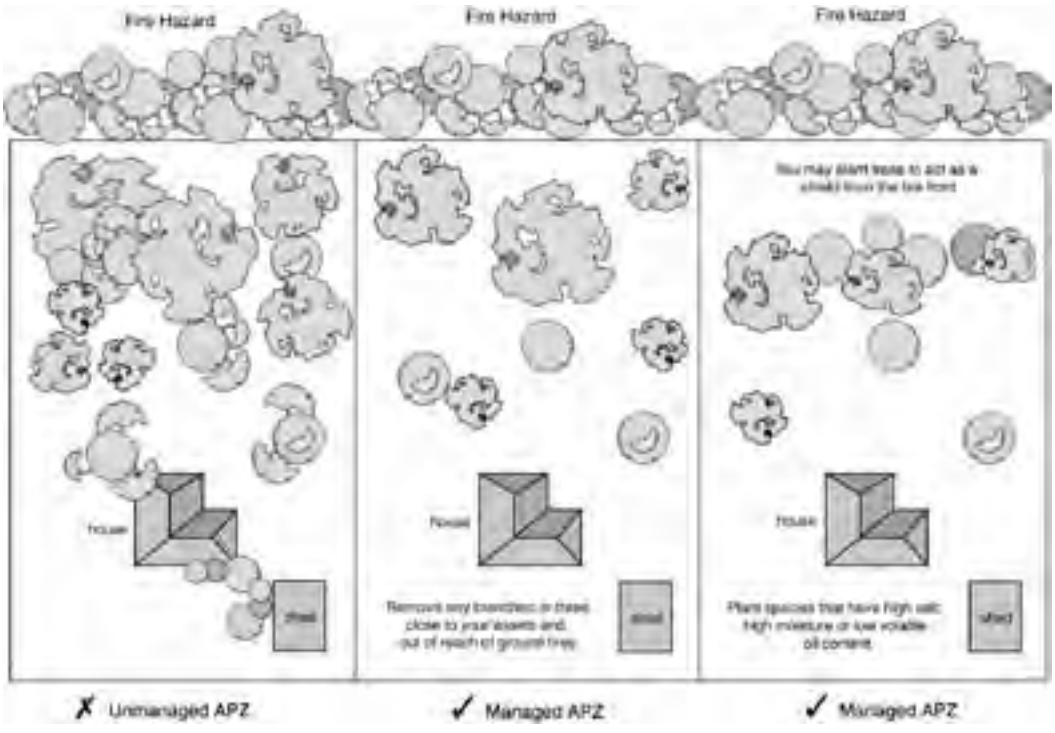
WIND BREAKS

Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.



HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at **www.rfs.nsw.gov.au.**

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at **www.rfs.nsw.gov.au.**

Produced by the NSW Rural Fire Service, Locked Mail Bag 17, GRANVILLE, NSW 2142. Ph. 1800 679 737
www.rfs.nsw.gov.au

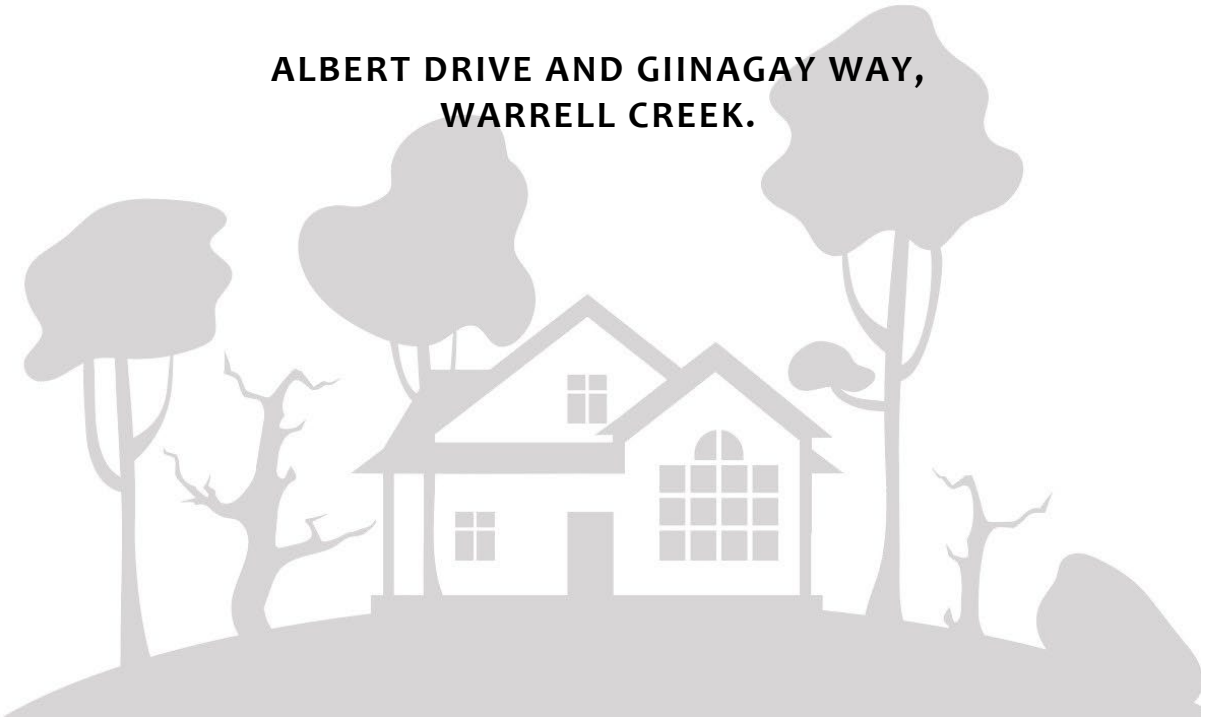
Printed on 100% Recycled Cyclus Offset paper.

NVC-2023-08 APPENDIX B

SECTIONS 3 AND 5 (BAL-12.5) OF *AS 3959 CONSTRUCTION OF BUILDINGS IN BUSHFIRE-PRONE AREAS*

SUBDIVISION

ALBERT DRIVE AND GIINAGAY WAY, WARRELL CREEK.



SECTION 3 GENERAL CONSTRUCTION REQUIREMENTS

3.1 GENERAL

This Section specifies general requirements for the construction of buildings for all Bushfire Attack Levels (BALs).

The BALs and the corresponding Sections for specific construction requirements are listed in Table 3. 1.

TABLE 3.1

BUSHFIRE ATTACK LEVELS AND CORRESPONDING SECTIONS FOR SPECIFIC CONSTRUCTION REQUIREMENTS

Bushfire Attack Level	Classified vegetation within 100m of the site and heat flux exposure thresholds	Description of predicted bushfire attack and levels of exposure	Construction Section
BAL-Low	See clause 2.2.3.2	There is insufficient risk to warrant specific construction requirements	4
BAL-12.5	≤12.5kW/m^2	Ember attack	3 & 5
BAL-19	>12.5kW/m^2 ≤19kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 & 6
BAL-29	>19kW/m^2 ≤29kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux	3 & 7
BAL-40	>29kW/m^2 ≤40kW/m^2	Increasing levels of ember attack and burning debris ignited by windborne embers together with increasing heat flux with the increased likelihood of direct contact with flames	3 & 8
BAL-FZ	>40kW/m^2	Direct exposure to flames from the fire front in addition to heat flux and ember attack	3 & 9

3.2 CONSTRUCTION REQUIREMENTS FOR SPECIFIC STRUCTURES

3.2.1 Attached structures and structures sharing a common roof space

Where any part of a garage, carport, veranda, cabana, studio, storage area or similar roofed structure is attached to, or shares a common roof space with, a building required to conform with this Standard, the entire garage, carport, veranda or similar roofed structure shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, the structure shall be separated from the subject building by a wall that extends to the underside of a non-combustible roof covering, and that conforms with one of the following:

(a) The wall shall have an FRL of not less than 60/60/60 for load bearing walls and -/60/60 for non-loadbearing walls when tested from the attached structure side and shall have openings protected as follows:

(i) *Doorways*-by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*-by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(b) The wall shall be of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and shall have openings protected as follows:

(i) *Doorways-by* self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*-by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.2 Garages and carports beneath the subject building

Where a garage or carport is beneath a building required to comply with this Standard, it shall conform with the construction requirements of this Standard, as applicable to the subject building.

Alternatively, any construction separating the garage or carport (including walls and flooring systems) from the remainder of the building shall conform with one of the following:

(a) The separating construction shall have an FRL of not less than 60/60/60 for loadbearing construction and -/60/60 for non-loadbearing construction when tested from the garage or carport side and shall have openings protected in accordance with the following:

(i) *Doorways*-by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*-by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL of not less than - /60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(b) Where part or all of the separating construction is a wall, the wall need not conform with Item (a) above, provided the wall is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness and the wall has openings protected in accordance with the following:

(i) *Doorways*-by self-closing fire doors with an FRL of -/60/30 conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*-by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL not less than -/60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.2.3 Adjacent structures on the subject allotment

Where any garage, carport, or similar roofed structure on the subject allotment is not attached to a building required to conform with this Standard, that structure shall conform with the construction requirements of this Standard.

Alternatively, the adjacent structure shall be separated from the subject building by one of the following:

(a) A distance of not less than 6 m from the building required to conform with this Standard. This distance is measured as any of the horizontal straight lines from the adjacent structure to the subject building.

or

(b) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and has an FRL of not less than 60/60/60 for load bearing walls and -/60/60 for non-loadbearing walls when tested from the outside. Any openings in the wall shall be protected in accordance with the following:

(i) *Doorways*-by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows*-by fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

or

(c) A wall of the building required to conform that extends to the underside of a non-combustible roof covering and is of masonry, earth or masonry-veneer construction with the masonry leaf of not less than 90 mm in thickness. Any openings in the wall shall be protected in accordance with the following:

(i) *Doorways*-by self-closing fire doors with an FRL of -/60/30, conforming with AS 1905.1 and tested in accordance with AS 1530.4.

(ii) *Windows-by* fire windows with an FRL of -/60/- when tested in accordance with AS 1530.4 and permanently fixed in the closed position.

(iii) *Other openings*-by construction with an FRL of not less than -/60/- when tested in accordance with AS 1530.4.

NOTE: Control and construction joints, subfloor vents, weepholes and penetrations for pipes and conduits need not conform with Item (iii).

3.3 EXTERNAL MOULDINGS

Unless otherwise required in Clause 3.6.1 and Sections 5 to 9, combustible external mouldings, jointing strips, trims and sealants may be used for decorative purposes or to cover joints between sheeting material.

3.4 HIGHER LEVELS OF CONSTRUCTION

The construction requirements specified for a particular BAL shall be acceptable for a lower level.

NOTE: For example, if the site has been assessed at BAL-12.5, BAL-12.5 construction is required; however any element or combination of elements contained in BAL-19, BAL-29, BAL-40 and BAL-FZ levels of construct ion may be used to satisfy this Standard.

3.5 REDUCTION IN CONSTRUCTION REQUIREMENTS DUE TO SHIELDING

Where an elevation is not exposed to the source of bushfire attack, then the construction requirements for that elevation can reduce to the next lower BAL. However it shall not reduce to below BAL-12.5.

An elevation is deemed to be not exposed to the source of bushfire attack if all of the straight lines between that elevation and the source of bushfire attack are obstructed by another part of the same building (see Figure 3. 1). However it shall not reduce to below BAL-12.5.

The shielding of an elevation shall apply to all the elements of the wall, including openings, but shall not apply to subfloors or roofs.

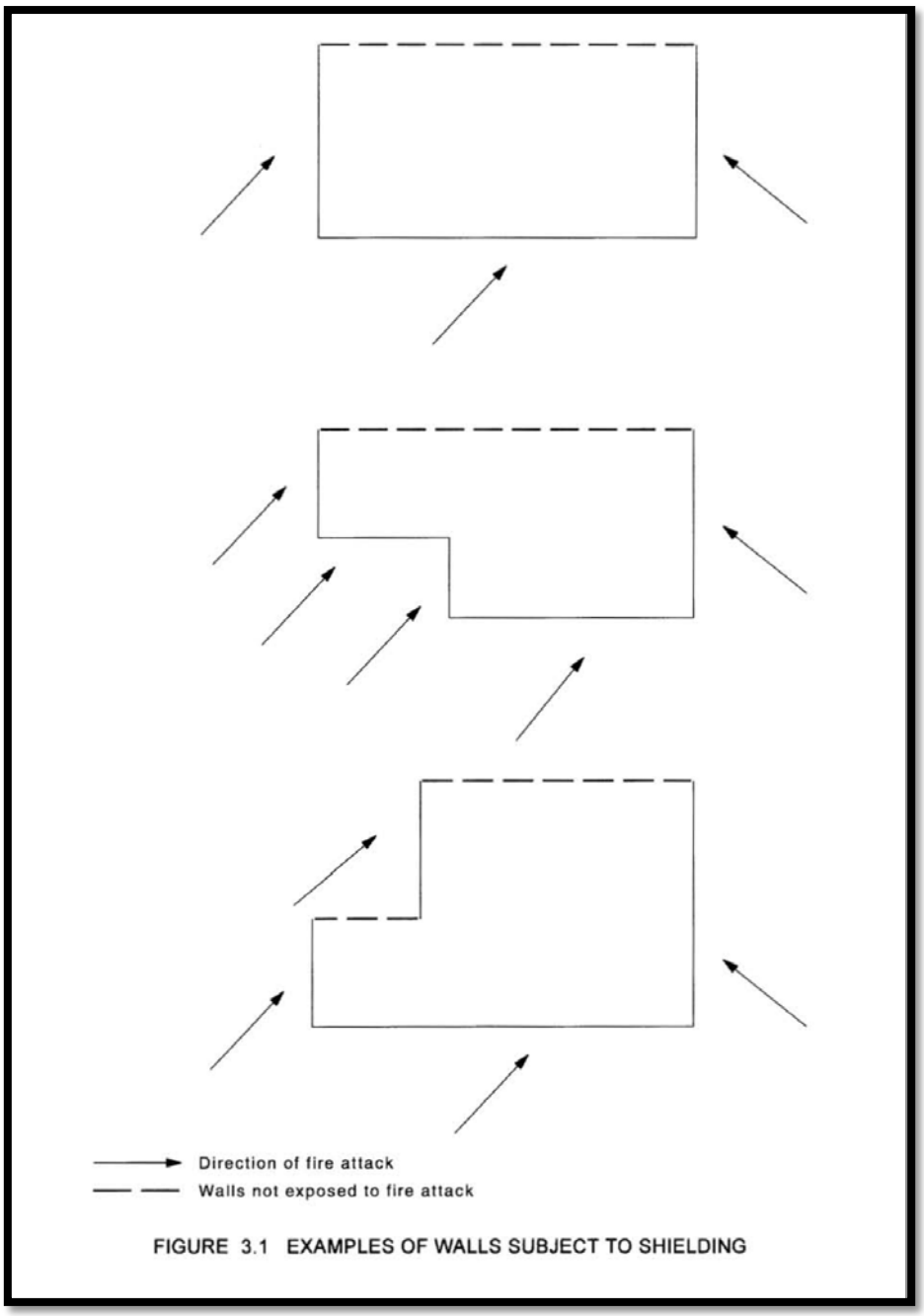


FIGURE 3.1 EXAMPLES OF WALLS SUBJECT TO SHIELDING

3.6 VENTS, WEEPHOLES, GAPS AND SCREENING MATERIALS

3.6.1 Vents, weepholes, joints and the like

All gaps including vents, weepholes and the like shall be screened, except for weepholes to the sills of windows and doors.

All joints shall be suitably backed with a breathable sarking or mesh, except as permitted by Clause 3.3.

The maximum allowable aperture size of any mesh or perforated material used as a screen shall be 2 mm.

C3.6.1 *Weepholes in sills of windows and doors and those gaps between doors and door jambs, heads or sills (thresholds) are exempt from screening because they do not provide a direct passage for embers to the interior of the building or building cavity.*

3.6.2 Gaps to door and window openings

Where screens are fitted to door openings for ember protection, they shall have a maximum aperture of 2 mm and be tight fitting to the frame in the closed position.

Gaps between doors including jambs, heads or sills (thresholds) shall be protected using draught seals and excluders or the like (see Figure 3.2).

Windows conformant with AS 2047 will satisfy the requirements for gap protection. Screens fitted to window openings shall have a maximum aperture of 2 mm and these shall be tight fitting to the frames.

C3.6.2 *There are no requirements to screen the openable parts of doors for ember protection at the lower BALs, however in many circumstances it may be desirable to screen the opening for insect protection. In such circumstances, where the insect screen is fitted internally, such screens may be considered as a door furnishing and the use of non-metallic mesh permissible, provided the screening system is fitted internally and wholly protected by the closed door.*

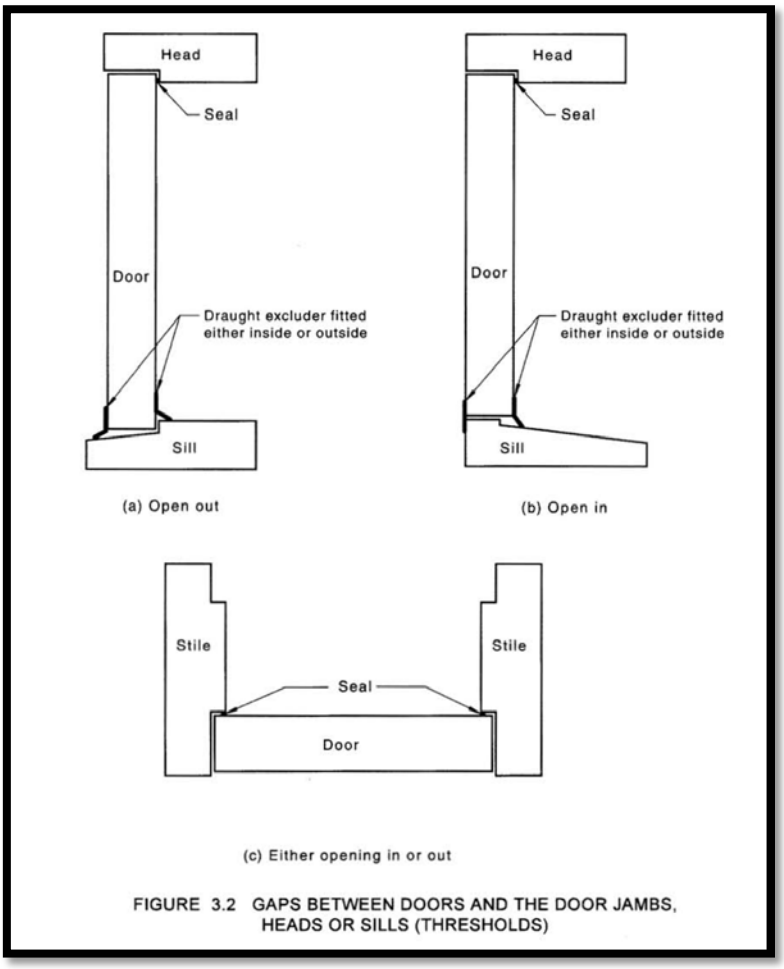


FIGURE 3.2 GAPS BETWEEN DOORS AND THE DOOR JAMBS, HEADS OR SILLS (THRESHOLDS)

3.7 BUSHFIRE SHUTTERS

Bushfire shutters shall-

(a) protect the entire window assembly including framing, glazing, sash and sill;

(b) protect the entire door assembly including framing, glazing, sill and hardware;

(c) consist of materials specified in Clauses 5.5.1, 6.5.1, 7.5.1, 8.5.1 and 9.5.1 for the relevant BAL;

(d) be fixed to the building and be non-removable;

(e) be capable of being closed manually from either inside or outside or motorised shutter systems, where they are not reliant on mains power to close;

NOTE: If power-assisted shutter systems are used then that system is powered with continuous back-up energy such as a battery system.

(f) when in the closed position, have no gap greater than 2 mm between the shutter and the wall, frame or sill; and

(g) where perforated, have uniformly distributed perforations with a maximum aperture of 2 mm and a perforated area no greater than 20% of the shutter.

If bushfire shutters are fitted to all external doors then at least one of those shutters shall be operable from the inside to facilitate safe egress from the building.

3.8 TESTING OF MATERIALS, ELEMENTS OF CONSTRUCTION AND SYSTEMS TO THE AS 1530.8 SERIES

Unless otherwise specified, elements of construction and systems satisfy this Standard when tested in accordance with the AS 1530.8 series for the relevant BAL level and Crib Class in Table 3.2.

Elements of construction or systems tested in accordance with AS 1530.8.1-2007 with Crib Class A prior to the issue of this Standard are acceptable.

TABLE 3.2

TESTING OF MATERIALS, ELEMENTS OF CONSTRUCTION AND SYSTEMS

Acceptable test criteria	Relevant allowable BAL level	Crib class
AS 1530.8.1	BAL-12.5 to BAL-40	AA
AS 1530.8.2	BAL-FZ	Not applicable

Where any element of construction or system satisfies the test criteria in the AS 1530.8 series without screening for ember protection, the requirements of this Standard for screening of openable parts of windows shall still apply.

Where a window protected with a shutter satisfies the test criteria of the AS 1530.8 series, the additional requirements of this Standard for screening of openable parts of windows do not apply.

NOTE: The ember protection function of tested shutter has been verified by the testing.

3.9 GLAZING

Glazing requirements shall be in accordance with Sections 5 to 9 of this Standard.

NOTES:

1. Where double-glazed assemblies are used, the glazing requirements provided in this Standard apply to the external face of the glazed assembly only.

2. Refer to AS 1288 for an explanation of the terminologies used to describe various types of glass in this Standard.

3.10 SARKING

Where sarking is required in Sections 5 to 9, the flammability index shall not exceed five when tested to AS 1530.2.

C3.10 *Sarking material is a principle component used to control condensation and is used for energy efficiency purposes under the NCC. It may be vapour permeable or impermeable dependant on its location within the structure. Seek independent advice regarding selection of sarking prior to installation.*

3.11 TIMBER LOG WALLS

Where the thickness of a timber log wall is specified in Sections 5, 6 and 7, two criteria are nominated, as follows:

(a) The nominal overall thickness is the overall thickness of the wall.

(b) The minimum thickness is the thickness of the wall at the interface of two logs in the wall.

For most log profiles, the thickness of the log at the interface with an adjacent log is less than the overall thickness of the wall.

SECTION 5 CONSTRUC TION REQUIREMENTS FOR BAL-12.5

5.1 GENERAL

A building assessed in Section 2 as being BAL-12.5 shall conform with Section 3 and Clauses 5.2 to 5.8.

Any element of construction or system that satisfies the test criteria of AS 1530.8.1 may be used in lieu of the applicable requirements contained in Clauses 5.2 to 5.8 (see Clause 3.8).

NOTE: BAL-12.5 is primarily concerned with protection from ember attack and radiant heat up to and including 12.5 kW/m^2 where the site is less than 100 m from the source of bushfire attack.

5.2 SUB-FLOOR SUPPORTS

This Standard does not provide construction requirements for subfloor support where the subfloor space is enclosed with-

(a) a wall that conforms with Clause 5.4; or

(b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or

(c) a combination of Items (a) and (b).

NOTE: This requirement applies to the subject building only and not to verandas, decks, steps, ramps and landings (see Clause 5.7).

C5.2 *Combustible materials stored in the subfloor space may be ignited by embers and cause an impact to the building.*

5.3 FLOORS

5.3.1 General

This Standard does not provide construction requirements for concrete slabs on the ground.

5.3.2 Elevated floors

5.3.2.1 *Enclosed subfloor space*

This Standard does not provide construction requirements for elevated floors, including bearers, joists and flooring, where the sub floor space is enclosed with-

(a) a wall that conforms with Clause 5.4; or

(b) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion resistant steel, bronze or aluminium; or

(c) a combination of Items (a) and (b) above.

5.3.2.2 *Unenclosed subfloor space*

Where the subfloor space is unenclosed, the bearers, joists and flooring, less than 400 mm above finished ground level, shall be one of the following:

(a) Materials that conform with the following:

  (i) Bearers and joists shall be-

    (A) non-combustible; or

    (B) bushfire-resisting timber (see Appendix F); or

    (C) a combination of Items (A) and (B).

  (ii) Flooring shall be-

    (A) non-combustible; or

    (B) bushfire-resisting timber (see Appendix F); or

    (C) timber (other than bushfire-resisting timber), particleboard or plywood flooring where the underside is lined with sarking-type material or mineral wool insulation; or

(D) a combination of any of Items (A), (B) or (C);

or

(b) A system conforming with AS 1530.8.1.

This Standard does not provide construction requirements for elements of elevated floors, including bearers, joists and flooring. if the underside of the element is 400 mm or more above finished ground level.

5.4 WALLS

5.4.1 General

The exposed components of an external wall that are less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle of less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D) shall be one of the following:

(a) Non-combustible material including the following provided the minimum thickness is 90 mm:

(i) Full masonry or masonry veneer walls with an outer leaf of clay, concrete, calcium silicate or natural stone.

(ii) Precast or in situ walls of concrete or aerated concrete.

(iii) Earth wall including mud brick; or

(b) Timber logs of a species with a density of 680 kg/m^3 or greater at a 12% moisture content; of a minimum nominal overall thickness of 90 mm and a minimum thickness of 70 mm (see Clause 3.11); and gauge planed; or

(c) Cladding that is fixed externally to a timber-framed or a steel-framed wall and is-

(i) non-combustible material; or

(ii) fibre-cement a minimum of 6 mm in thickness; or

(iii) bushfire-resisting timber (see Appendix F); or

(iv) a timber species as specified in Paragraph E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv); or

(d) A combination of any of Items (a), (b) or (c).

This Standard does not provide construction requirements for the exposed components of an external wall that are 400 mm or more from the ground or 400 mm or more above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the wall (see Figure D3, Appendix D).

5.4.2 Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed.

5.4.3 Vents and weepholes

Except for exclusions provided in Clause 3.6, vents and weepholes in external walls shall be screened with a mesh made of corrosion-resistant steel, bronze or aluminium.

5.5 EXTERNAL GLAZED ELEMENTS, ASSEMBLIES AND DOORS

5.5.1 Bushfire shutters

Where fitted, bushfire shutters shall conform with Clause 3.7 and be made from-

(a) non-combustible material; or

(b) a timber species as specified in Paragraph E1, Appendix E; or

(c) bushfire-resisting timber (see Appendix F); or

(d) a combination of any of Items (a), (b) or (c).

5.5.2 Screens for windows and doors

Where fitted, screens for windows and doors shall have a mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium.

The frame supporting the mesh or perforated sheet shall be made from-

(a) metal; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E2, Appendix E.

5.5.3 Windows and sidelights

Window assemblies shall:

(a) Be completely protected by a bushfire shutter that conforms with Clause 3.7 and Clause 5.5.1; or

(b) Be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2.

C5.5.3 *For Clause 5.5.3(b), the screening needs to be applied to cover the entire assembly, that is including framing, glazing, sash, sill and hardware.*

or

(c) Conform with the following:

(i) *Frame material* For window assemblies less than 400 mm from the ground or less than 400 mm above decks, carport roofs. awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D),window frames and window joinery shall be made from one of the following:

(A) Bushfire-resisting timber (see Appendix F); or

(B) A timber species as specified in Paragraph E2, Appendix E; or

(C) Metal; or

(D) Metal-reinforced uPVC. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

There are no specific restrictions on frame material for all other windows.

(ii) *Hardware* There are no specific restrictions on hardware for windows.

(iii) *Glazing* Where glazing is less than 400 mm from the ground or less than 400 mm above decks, carport roofs, awnings and similar elements or fittings having an angle less than 18 degrees to the horizontal and extending more than 110 mm in width from the window frame (see Figure D3, Appendix D), this glazing shall be Grade A safety glass a minimum of 4 mm in thickness or glass blocks with no restriction on glazing methods.

NOTE: Where double-glazed assemblies are used above, the requirements apply to the external pane of the glazed assembly only. For all other glazing, annealed glass may be used in accordance with AS 1288.

(iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL level.

(v) *Screens* The openable portions of windows shall be screened internally or externally with screens that conform with Clause 3.6 and Clause 5.5.2.

C5.5.3 *For Clause 5.5.3(c), screening to openable portions of all windows is required in all BALs to prevent the entry of embers to the building when the window is open.*

For Clause 5.5.3(c)(v), screening of the openable and fixed portions of some windows is required to reduce the effects of radiant heat on annealed glass and has to be externally fixed.

For Clause 5.5.3(c)(v), if the screening is required only to prevent the entry of embers, the screening may be fitted externally or internally.

5.5.4 Doors--Side-hung external doors (including French doors, panel fold and bi-fold doors)

Side-hung external doors, including French doors, panel fold and bi-fold doors, shall-

(a) be completely protected by bushfire shutters that conform with Clause 3.7 and Clause 5.5.1;

or

(b) be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2;

or

(c) conform with the following:

(i) *Door panel material* Materials shall be-

(A) non-combustible; or

(B) solid timber, laminated timber or reconstituted timber, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(C) hollow core, solid timber, laminated timber or reconstituted timber with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(D) hollow core, solid timber, laminated timber or reconstituted timber protected externally by a screen that conforms with Clause 5.5.2; or

(E) for fully framed glazed door panels, the framing shall be made from metal or bushfire resisting timber (see Appendix F) or a timber species as specified in Paragraph E2, Appendix E or uPVC.

(ii) *Door frame material* Door frame materials shall be-

(A) bushfire resisting timber (see Appendix F); or

(B) a timber species as specified in Paragraph E2 of Appendix E; or

(C) metal; or

(D) metal-reinforced uPVc. The reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

(iii) *Hardware* There are no specific requirements for hardware at this BAL level.

(iv) *Glazing* the glazing shall be Grade A safety glass a minimum of 4 mm in thickness, or glass blocks with no restriction on glazing methods.

NOTE: Where double glazed units are used the above requirements apply to the external face of the window assembly only.

(v) *Seals and weather strips* Weather strips, draft excluders or draft seals shall be installed.

(vi) *Screens* There are no requirements to screen the openable part of the door at this BAL level.

(vii) Doors shall be tight-fitting to the door frame and to an abutting door, if applicable.

5.5.5 Doors-Sliding doors

Sliding doors shall-

(a) be completely protected by a bush fire shutter that conforms with Clause 3.7 and Clause 5.5.1;

or

(b) be completely protected externally by screens that conform with Clause 3.6 and Clause 5.5.2; or

(c) conform with the following:

(i) *Frame material* The material for door frames, including fully framed glazed doors, shall be-

(A) bushfire-resisting timber (see Appendix F); or

(B) a timber species as specified in Paragraph E2, Appendix E; or

(C) metal; or

(D) metal-reinforced uPYC and the reinforcing members shall be made from aluminium, stainless steel, or corrosion-resistant steel.

(ii) *Hardware* There are no specific requirements for hardware at this BAL level.

(iii) *Glazing* Where doors incorporate glazing, the glazing shall be grade A safety glass a minimum of 4 mm in thickness.

(iv) *Seals and weather strips* There are no specific requirements for seals and weather strips at this BAL level.

(v) *Screens* There is no requirement to screen the openable part of the sliding door at this BAL level.

(vi) *Sliding panels* Sliding panels shall be tight-fitting in the frames.

5.5.6 Doors-Vehicle access doors (garage doors)

The following applies to vehicle access doors:

(a) The lower portion of a vehicle access door that is within 400 mm of the ground when the door is closed (see Figure D4, Appendix D) shall be made from-

(i) non-combustible material; or

(ii) bushfire-resisting timber (see Appendix F); or

(iii) fibre-cement sheet a minimum of 6 mm in thickness; or

(iv) a timber species as specified in Paragraph E1, Appendix E; or

(v) a combination of any of Items (i), (ii), (iii) or (iv).

(b) All vehicle access doors shall be protected with suitable weather strips, draught excluders, draught seals or brushes. Door assemblies fitted with guide tracks do not need edge gap protection.

NOTES:

1 Refer to *ASINZS* 4505 for door types.

2 Gaps of door edges or building elements should be protected as per Section 3.

C5.5.6(b) *These guide tracks do not provide a direct passage for embers into the building.*

(c) Vehicle access doors with ventilation slots shall be protected in accordance with Clause 3.6.

5.6 ROOFS (INCLUDING PENETRATIONS, EAVES, FASCIAS AND GABLES, AND GUTTERS AND DOWNPIPES)

5.6.1 General

The following applies to all types of roofs and roofing systems:

(a) Roof tiles, roof sheets and roof-covering accessories shall be non-combustible.

(b) The roof/wall and roof/roof junction shall be sealed or otherwise protected in accordance with Clause 3.6.

(c) Roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet conforming with Clause 3.6 and, made of corrosion-resistant steel, bronze or aluminium.

(d) Only evaporative coolers manufactured in accordance with AS/NZS 60335.2.98 shall be used. Evaporative coolers with an internal damper to prevent the entry of embers into the roof space need not be screened externally.

5.6.2 Tiled roofs

Tiled roofs shall be fully sarked. The sarking shall-

(a) be located on top of the roof framing. except that the roof battens may be fixed above the sarking;

(b) cover the entire roof area including ridges and hips; and

(c) extend into gutters and valleys.

5.6.3 Sheet roofs

Sheet roofs shall-

(a) be fully sarked in accordance with Clause 5.6.2, except that foil-backed insulation blankets may be installed over the battens; or

(b) have any gaps sealed at the fascia or wall line, hips and ridges by-

(i) a mesh or perforated sheet that conforms with Clause 3.6 and that is made of corrosion-resistant steel, bronze or aluminium; or

(ii) mineral wool; or

(iii) other non-combustible material; or

(iv) a combination of any of Items (i), (ii) or (iii).

C5.6.3 *Sarking is used as a secondary form of ember protection for the roof space to account for minor gaps that may develop in sheet roofing.*

5.6.4 Veranda, carport and awning roof

The following applies to veranda, carport and awning roofs:

(a) A veranda, carport or awning roof forming part of the main roof space [see Figure D1(a), Appendix D] shall meet all the requirements for the main roof as specified in Clauses 5.6.1 to 5.6.6.

(b) A veranda, carport or awning roof separated from the main roof space by an external wall [see Figures D1(b) and D1(c), Appendix D] conforming with Clause 5.4 shall have a non-combustible roof covering, except where the roof covering is a translucent or transparent material.

NOTE: There is no requirement to line the underside of a veranda, carport or awning roof that is separated from the main roofs pace.

5.6.5 Roof penetrations

The following applies to roof penetrations:

(a) Roof penetrations. including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials. vent pipes and supports for solar collectors or the like, shall be sealed. The material used to seal the penetration shall be non-combustible.

(b) Openings in vented roof lights, roof ventilators or vent pipes shall conform with Clause 3.6 and be made of corrosion-resistant steel, bronze or aluminium.

This requirement does not apply to a room sealed gas appliance.

NOTE: A gas appliance designed such that air for combustion does not enter from, or combustion products enter into, the room in which the appliance is located.

In the case of gas appliance flues, ember guards shall not be fitted .

NOTE: AS/NZS 5601 contains requirements for gas appliance flue systems and cowls. Advice can be obtained from manufacturers and State and Territory gas technical regulators.

(c) All overhead glazing shall be Grade A safety glass conforming with AS 1288.

(d) Glazed elements in roof lights and skylights may be of polymer provided a Grade A safety glass diffuser, conforming with AS 1288, is installed under the glazing. Where glazing is an insulating glazing unit (IGU), Grade A toughened safety glass of minimum 4 mm in thickness shall be used in the outer pane of the IGU.

(e) Flashing elements of tubular sky lights may be of a fire-retardant material, provided the roof integrity is maintained by an under-flashing of a material having a flammability index not exceeding five.

(f) Evaporative cooling units shall be fitted with non-combustible butterfly closers as close as practicable to the roof level or the unit shall be fitted with non-combustible covers with a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(g) Vent pipes made from PVC are permitted.

(h) Eaves lighting shall be adequately sealed and not compromise the performance of the element.

5.6.6 Eaves linings, fascias and gables

The following applies to eaves linings, fascias and gables:

(a) Gables shall conform with Clause 5.4.

(b) Eaves penetrations shall be protected in the same way as roof penetrations. as specified in Clause 5.6.5.

(c) Eaves ventilation openings shall be fitted with ember guards in accordance with Clause 3.6 and made of corrosion-resistant steel, bronze or aluminium.

Joints in eaves linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

This Standard does not provide construction requirements for fascias, bargeboards and eaves linings.

5.6.7 Gutters and down pipes

This Standard does not provide material requirements for-

(a) gutters, with the exception of box gutters; and

(b) downpipes.

If installed, gutter and valley leaf guards shall be non-combustible.

Box gutters shall be non-combustible and flashed at the junction with the roof with non-combustible material.

5.7 VERANDAS, DECKS, STEPS AND LANDINGS

5.7.1 General

Decking may be spaced.

There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

C5.7.7 *Spaced decking is nominally spaced at* 3 *mm (in accordance with standard industry practice); however, due to the nature of timber decking with seasonal changes in moisture content, that spacing may range from 0 mm- 5 mm during service. It should be noted that recent research studies have shown that gaps at* 5 *mm spacing afford opportunity for embers to become lodged in between timbers, which may contribute to a fire. Larger gap spacing of 10 mm may preclude this from happening but such a spacing regime may not be practical for a timber deck.*

5.7.2 Enclosed Subfloor spaces of verandas, decks, steps, ramps and landings

5.7.2.1 *Materials to enclose a subfloor space*

This Standard does not provide construction requirements for the materials used to enclose a subfloor space except where those materials are less than 400 mm from the ground.

Where the materials used to enclose a subfloor space are less than 400 mm from the ground, they shall conform with Clause 5.4.

5.7.2.2 *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

5.7.2.3 *Framing*

This Standard does not provide construction requirements for the framing of verandas, pergolas, decks, ramps or landings (i.e. bearers and joists).

5.7.2.4 *Decking, stair treads and the trafficable surfaces of ramps and landings*

This Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings that are more than 300 mm from a glazed element.

Decking, stair treads and the trafficable surfaces of ramps and landings less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from-

(a) non-combustible material ; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E1, Appendix E; or

(d) uPVC; or

(e) a combination of any of Items (a), (b), (c) or (d).

5.7.3 Unenclosed subfloor spaces of verandas, decks, steps, ramps and landings

5.7.3.1 *Supports*

This Standard does not provide construction requirements for support posts, columns, stumps, stringers, piers and poles.

5.7.3.2 *Framing*

This Standard does not provide construction requirements for the framing of verandas, decks, ramps or landings (i.e. bearers and joists).

5.7.3.3 *Decking, stair treads and the trafficable surfaces of ramps and landings*

This Standard does not provide construction requirements for decking, stair treads and the trafficable surfaces of ramps and landings that are more than 300 mm from a glazed element.

Decking, stair treads and the trafficable surfaces of ramps and landings less than 300 mm (measured horizontally at deck level) from glazed elements that are less than 400 mm (measured vertically) from the surface of the deck (see Figure D2, Appendix D) shall be made from-

(a) non-combustible material ; or

(b) bushfire-resisting timber (see Appendix F); or

(c) a timber species as specified in Paragraph E1, Appendix E; or

(d) a combination of any of Items (a), (b) or (c) above.

5.7.4 Balustrades, handrails or other barriers

This Standard does not provide construction requirements for balustrades, handrails and other barriers.

5.7.5 Veranda posts

Veranda posts-

(a) shall be timber mounted on galvanized mounted shoes or stirrups with a clearance of not less than 75 mm above the adjacent finished ground level; or

(b) less than 400 mm (measured vertically) from the surface of the deck or ground (see Figure D2, Appendix D) shall be made from-

  (i) non-combustible material; or

  (ii) bushfire-resisting timber (see Appendix F); or

  (iii) a timber species as specified in Paragraph E1, Appendix E; or

  (iv) a combination of any of Items (a) or (b).

5.8 WATER AND GAS SUPPLY PIPES

Above-ground, exposed water supply pipes shall be metal.

External gas pipes and fittings above ground shall be of steel or copper construction having a minimum wall thickness in accordance with gas regulations or 0.9 mm whichever is the greater. The metal pipe shall extend a minimum of 400 mm within the building and 100 mm below ground.

NOTE: Refer to State and Territory gas regulations, AS/NZS 5601.1 and AS/NZS 4645.1.

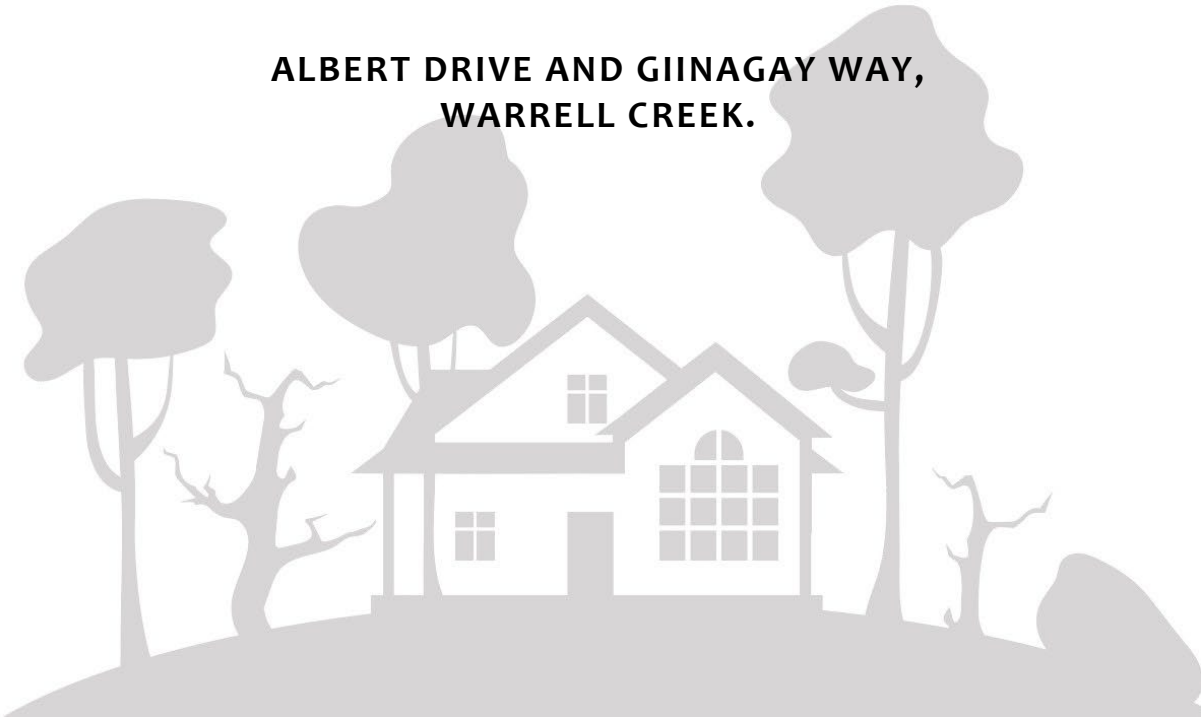
C5.8 *Concern is raised for the protection of bottled gas installations. Location, shielding and venting of the gas bottles needs to be considered.*

NVC-2023-08 APPENDIX C

STANDARDS FOR PROPERTY ACCESS ROADS (ACCESS FOR FIREFIGHTING VEHICLES)

SUBDIVISION

ALBERT DRIVE AND GIINAGAY WAY, WARRELL CREEK.



APPENDIX 3

ACCESS

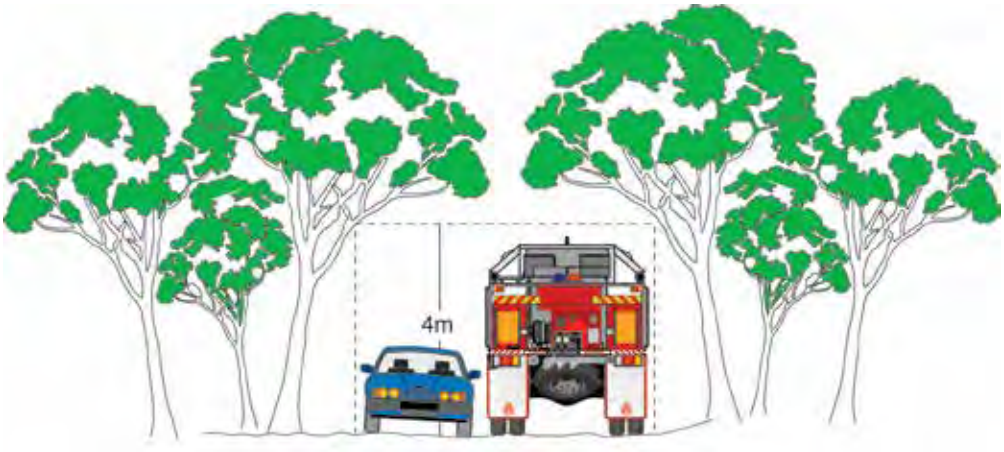
This appendix provides design principles for emergency service vehicle access.

A3.1 Vertical clearance

An unobstructed clearance height of 4 metres should be maintained above all access ways including clearance from building construction, archways, gateways and overhanging structures (e.g. ducts, pipes, sprinklers, walkways, signs and beams). This also applies to vegetation overhanging roads.

Figure A3.1

Vertical clearance.



A3.2 Vehicle turning requirements

Curved carriageways should be constructed using the minimum swept path as outlined in Table A3.2.

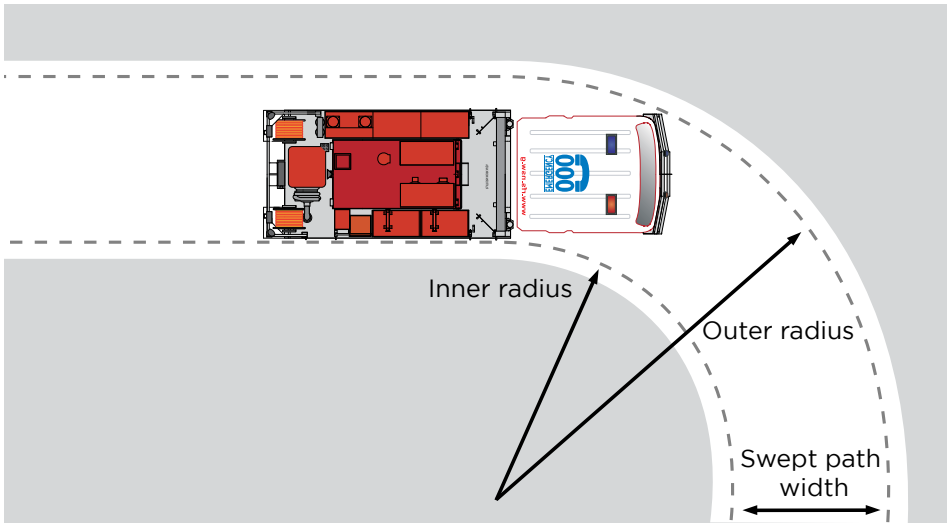
Table A3.2

Minimum curve radius for turning vehicles.

Curve radius (inside edge in metres)	Swept path (metres width)
< 40	4.0
40 - 69	3.0
70 - 100	2.7
> 100	2.5

Figure A3.2a

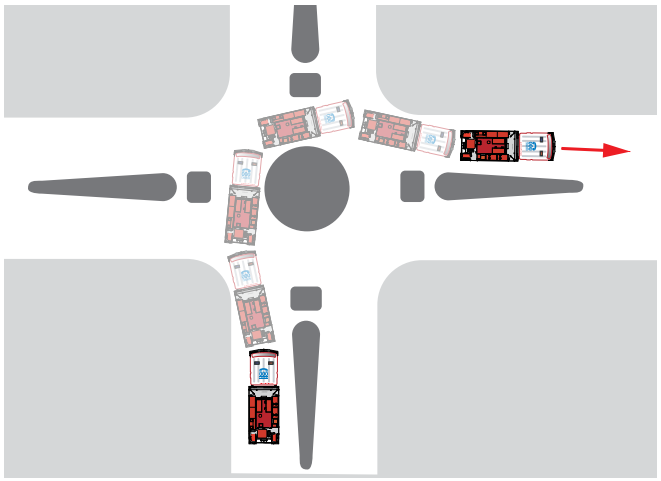
Swept path width for turning vehicles.



The radius dimensions given are for wall to wall clearance where body overhangs travel a wider arc than the wheel tracks (vehicle swept path). The swept path shall include an additional 500mm clearance either side of the vehicle.

Figure A3.2b

Roundabout swept path.



Example of a swept path as applied to a roundabout. The distance between inner and outer turning arcs allows for expected vehicle body swing of front and rear overhanging sections (the swept path).

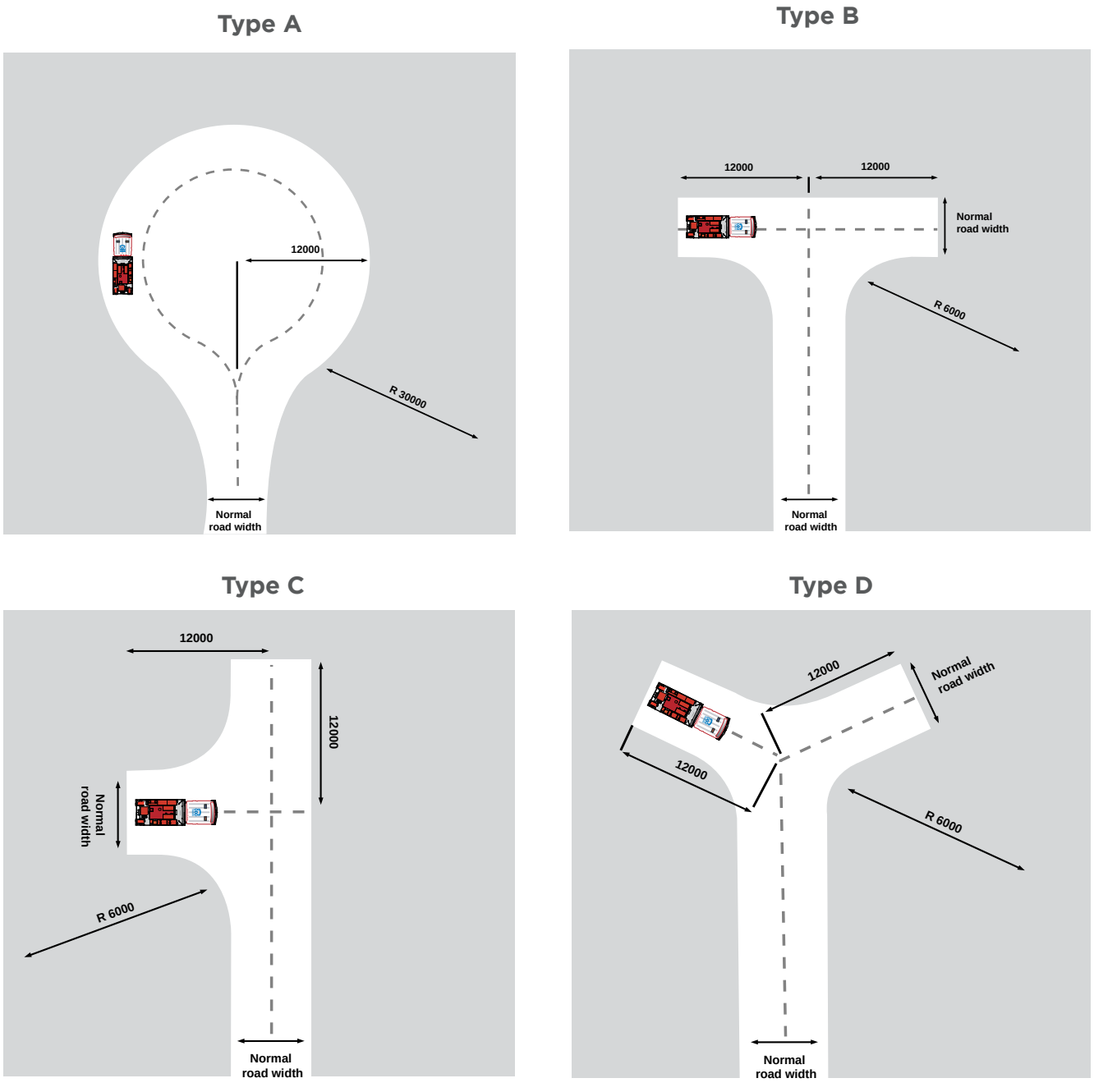
A3.3 Vehicle turning head requirements

Dead ends that are longer then 200m must be provided with a turning head area that avoids multipoint turns. “No parking” signs are to be erected within the turning head.

The minimum turning radius shall be in accordance with Table A3.2. Where multipoint turning is proposed the NSW RFS will consider the following options:

Figure A3.3

Multipoint turning options.



A3.4 Passing bays

The construction of passing bays, where required, shall be 20m in length and provide a minimum trafficable width at the passing point of 6m.

Figure A3.4

Passing bays can provide advantages when designed correctly. Poor design can and does severely impede access.

A3.5 Parking

Parking can create a pinch point in required access. The location of parking should be carefully considered to ensure fire appliance access is unimpeded. Hydrants shall be located outside of access ways and any parking areas to ensure that access is available at all times.

Figure A3.5

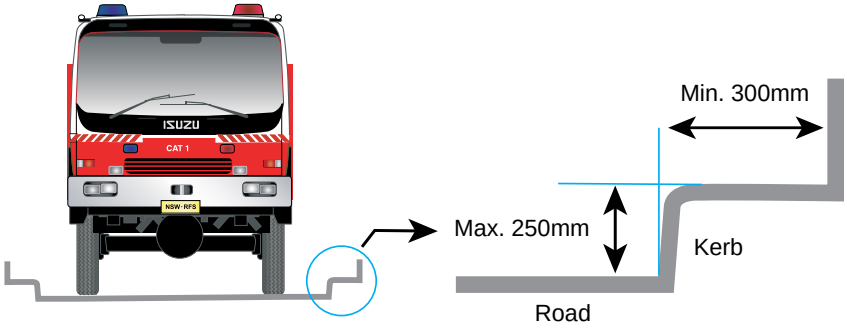
Hydrants and parking bays.

A3.6 Kerb dimensions

All kerbs constructed around access roads should be no higher than 250mm and free of vertical obstructions at least 300mm back from the kerb face to allow clearance for front and rear body overhang.

Figure A3.6

Carriageway kerb clearance dimensions.



A3.7 Services

Hydrant services should be located outside the carriageway and parking bays to permit traffic flow and access. Setup of standpipes within the carriageway may stop traffic flow. Hydrant services shall be located on the side of the road away from the bush fire threat where possible.

A3.8 Local Area Traffic Management (LATM)

The objective of LATM is to regulate traffic an acceptable level of speed and traffic volume within a local area.

Traffic engineers and planners should consider LATM devices when planning for local traffic control and their likely impact on emergency services. LATM devices by their nature are designed to restrict and impede the movement of traffic, especially large vehicles.

Where LATM devices are provided they are to be designed so that they do not impede fire vehicle access.

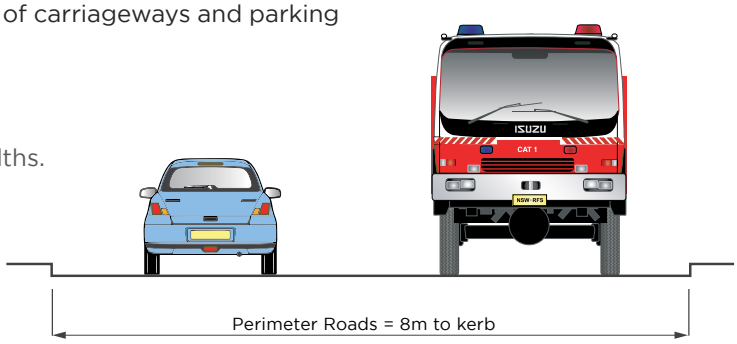
A3.9 Road types

A3.9.1 Perimeter Roads

Perimeter roads are to be provided with a minimum clear width of 8m. Parking and hydrants are to be provided outside of carriageways. Hydrants are to be located outside of carriageways and parking areas.

Figure A3.9a

Perimeter road widths.

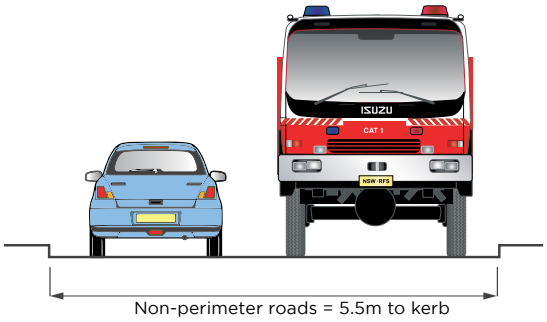


A3.9.2 Non-perimeter Roads

Non-perimeter roads shall be provided with a minimum clear width of 5.5m. Parking is to be provided outside of the carriageway and hydrants are not to be located in carriageways or parking areas.

Figure A3.9b

Non-perimeter road widths.



A3.9.3 Property access

Property access roads are to be a minimum of 4m wide.

Figure A3.9c

Property access road widths.